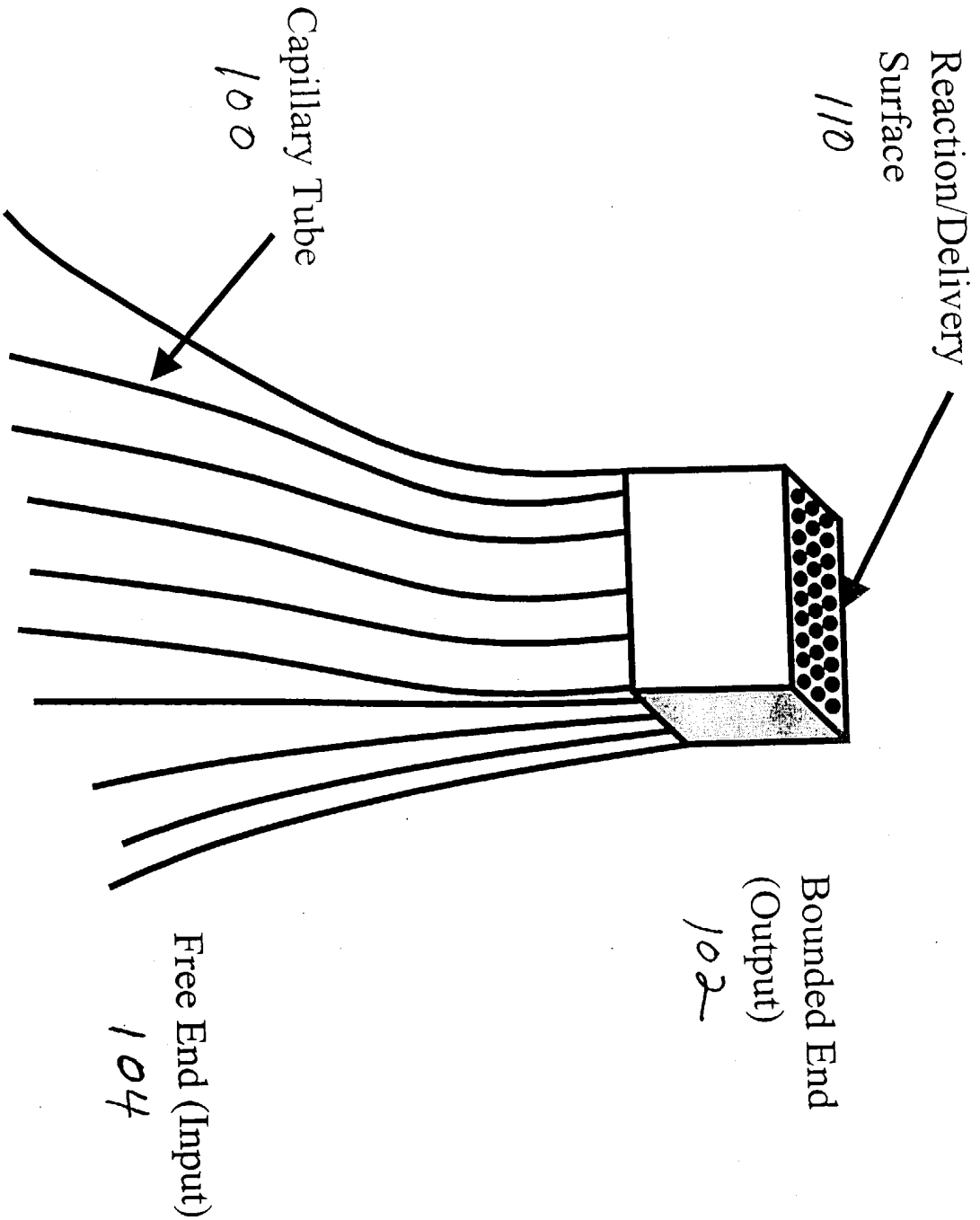
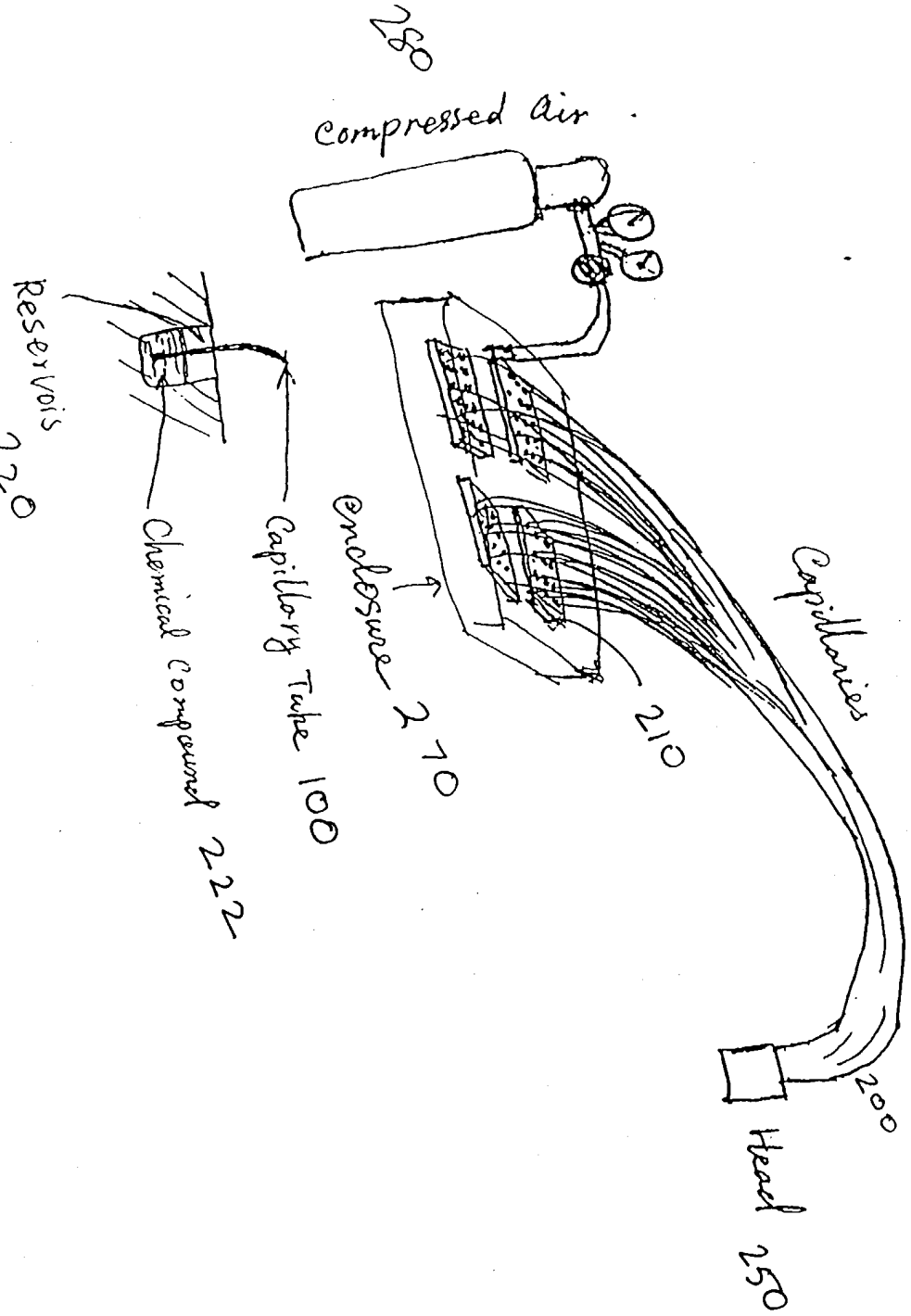

Capillary Tube
100
Reaction/Delivery Surface
110
Bounded End (Output)
102
Free End (Input)
104

Figure 1

Fig. 2A


280
Compressed air
Reservois 220
Chemical compound 222
Capillary Tube 100
Enclosure 270
210
Capillaries
200
Head 250

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XHTS

-- Microarrays and Fiber Bundles

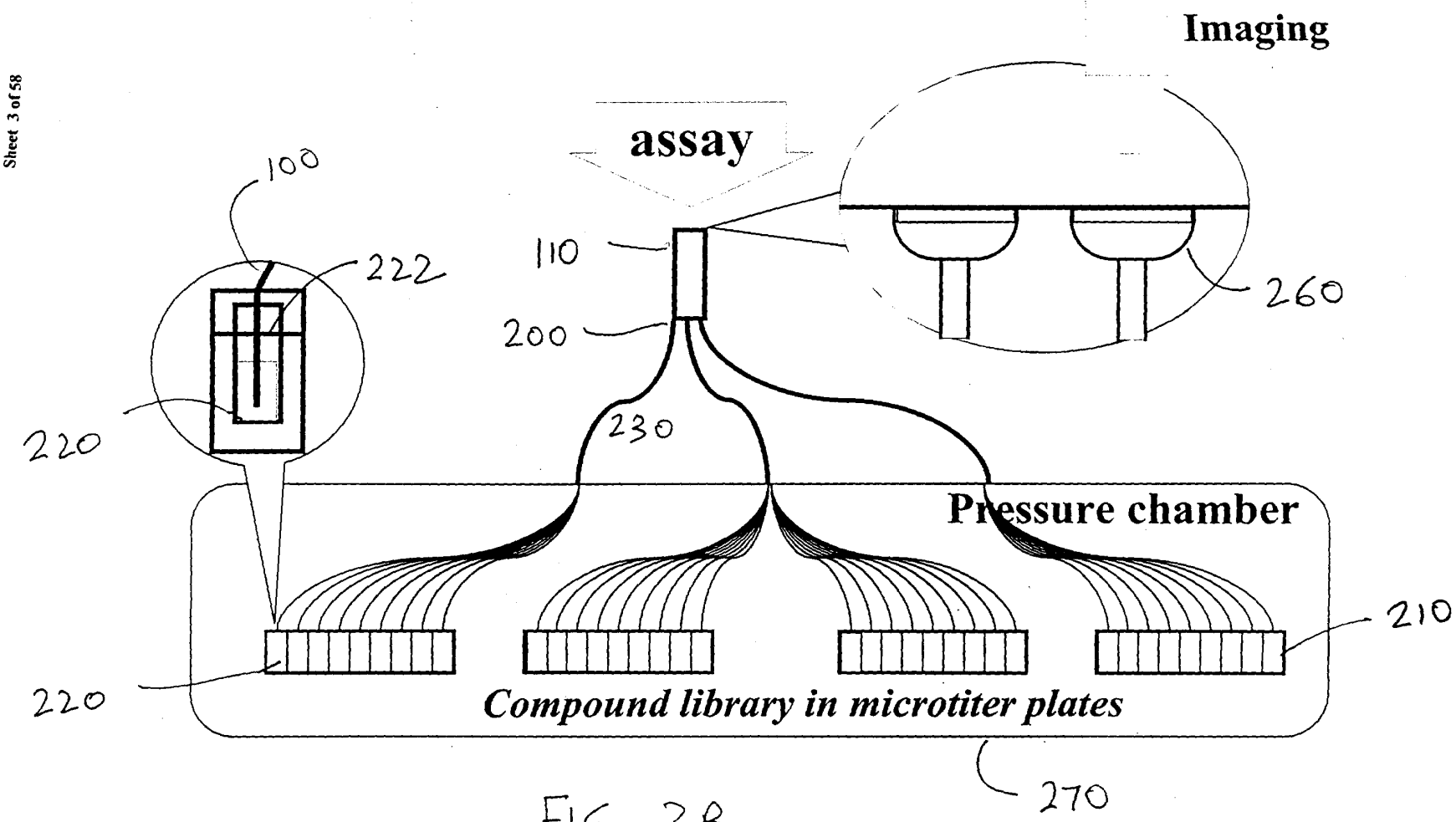


FIG. 2B

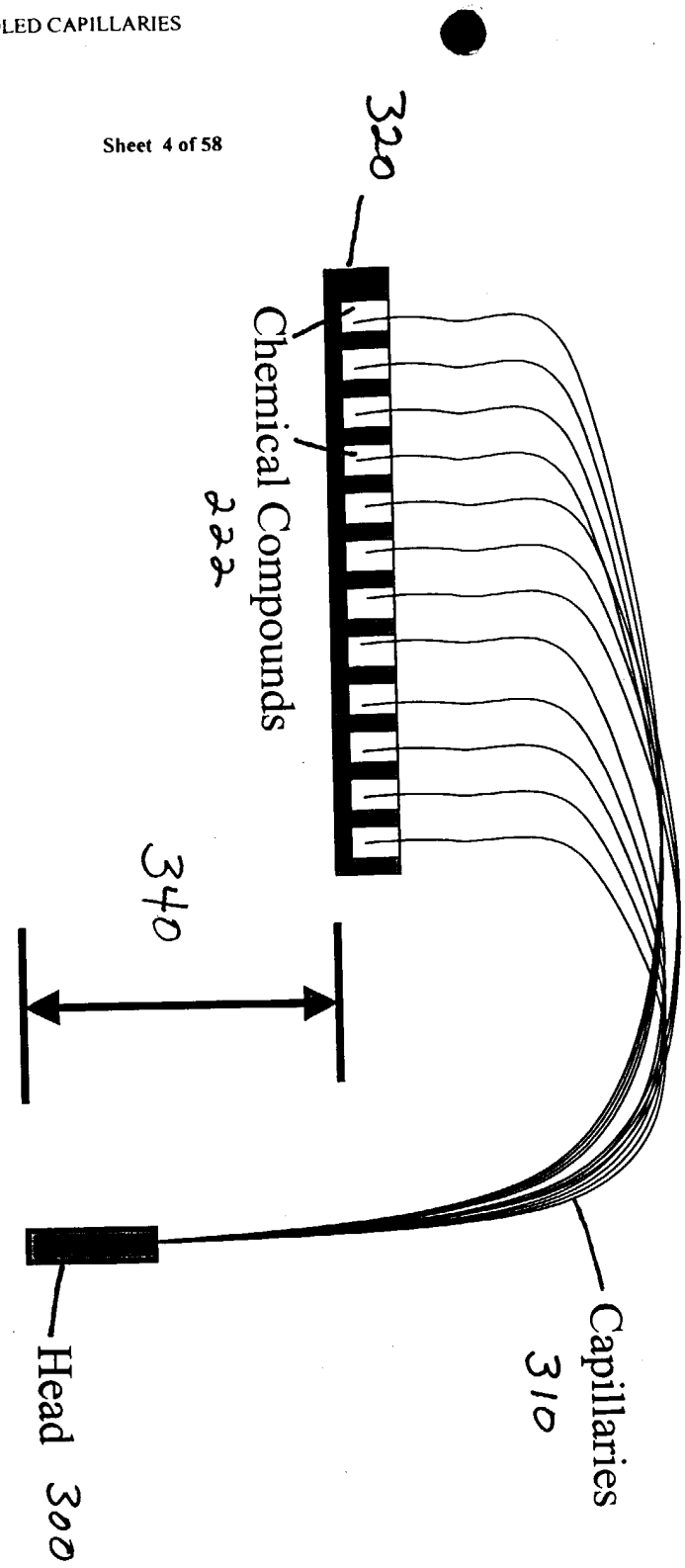


Figure 3

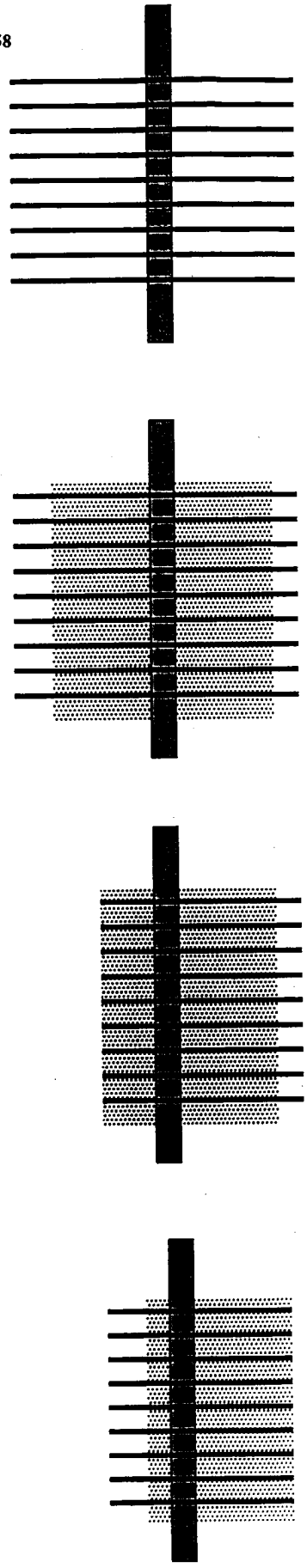
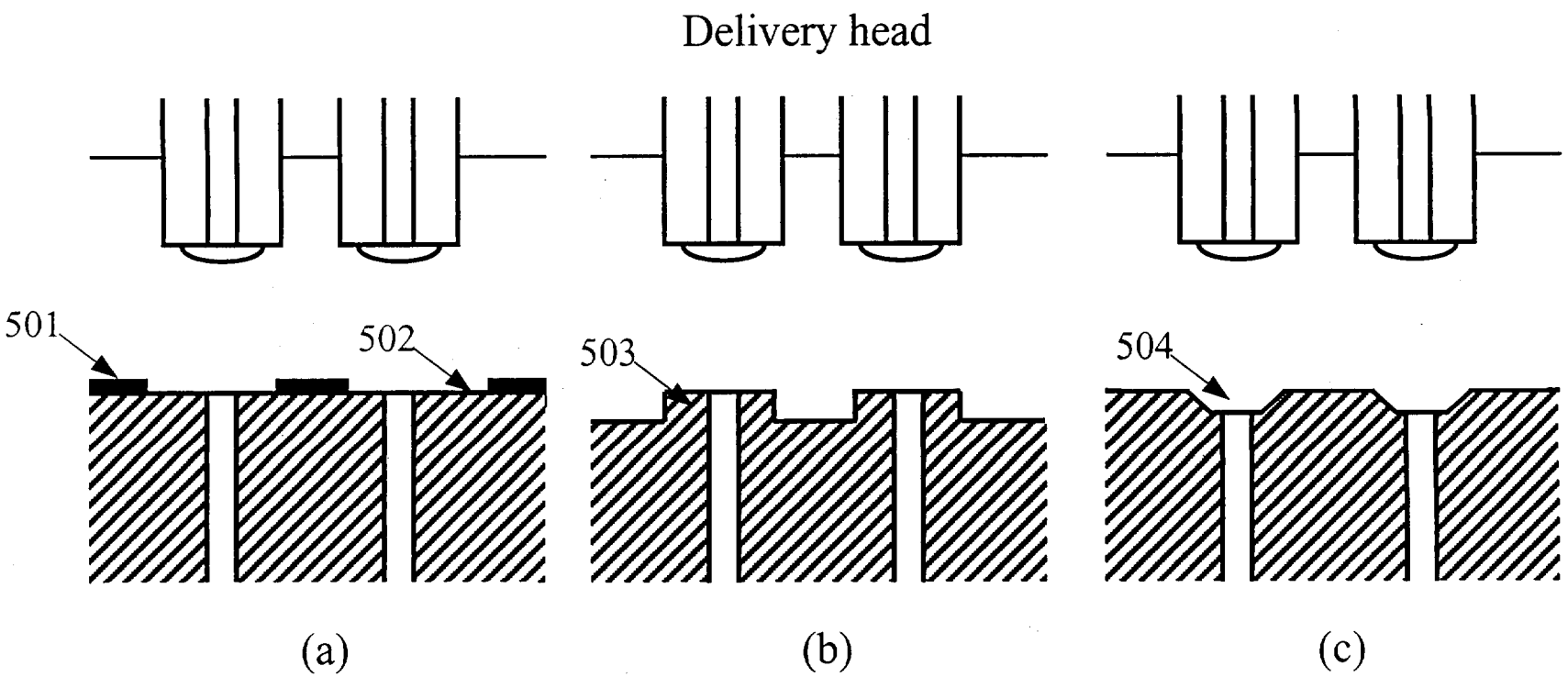


Fig. 4. Fabrication of delivery head using a guide plate



501 – Hydrophobic coating
502 – Hydrophilic coating
503 – Island
504 - Well

Fig. 5. Surface features on the surface of the capillary array compound library to prevent cross-contamination during compound loading

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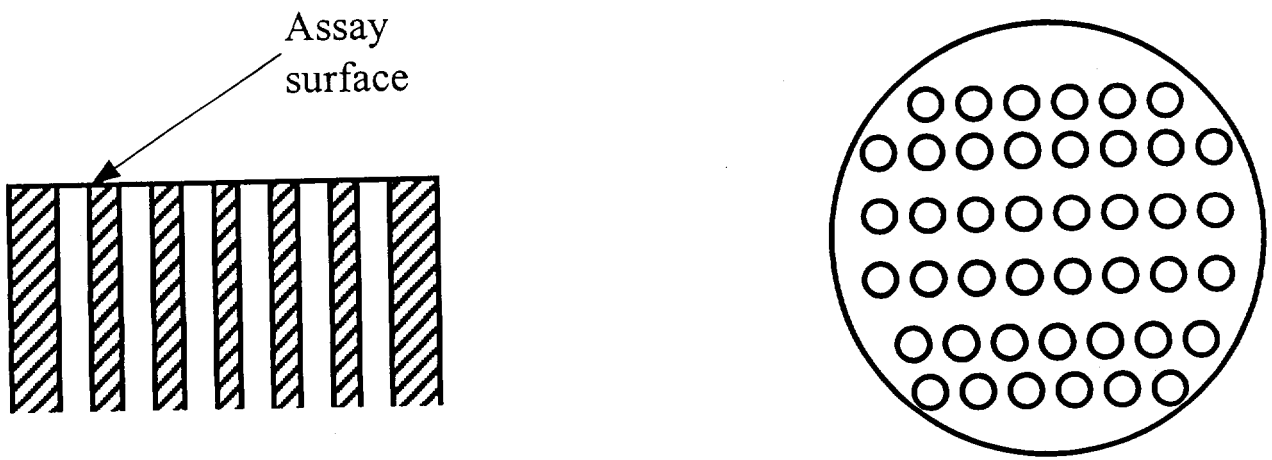

Fig. 6. Basic configuration of capillary array substrate for the portable compound library

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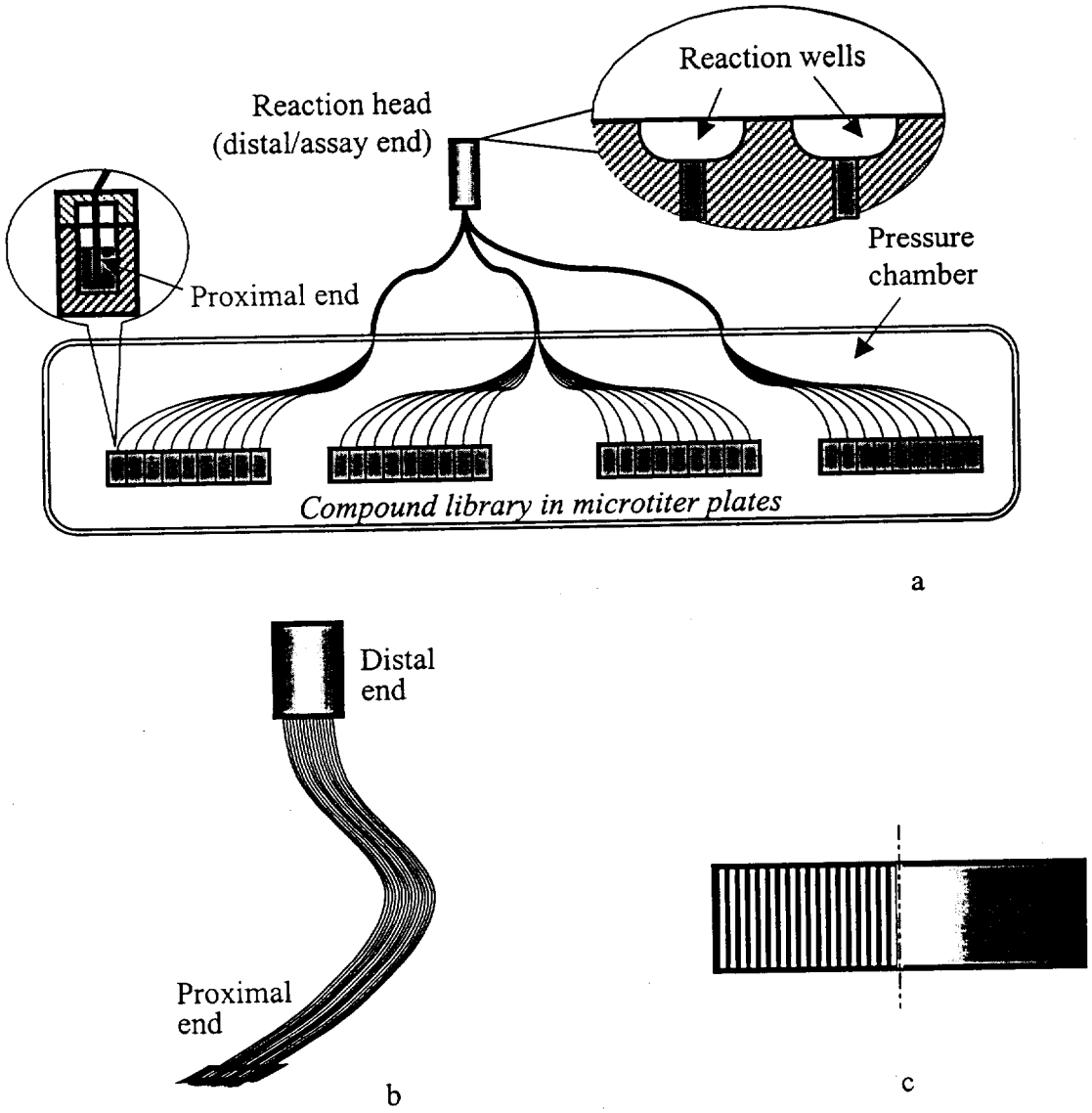

Fig. 7 The capillary array compound library in different formats

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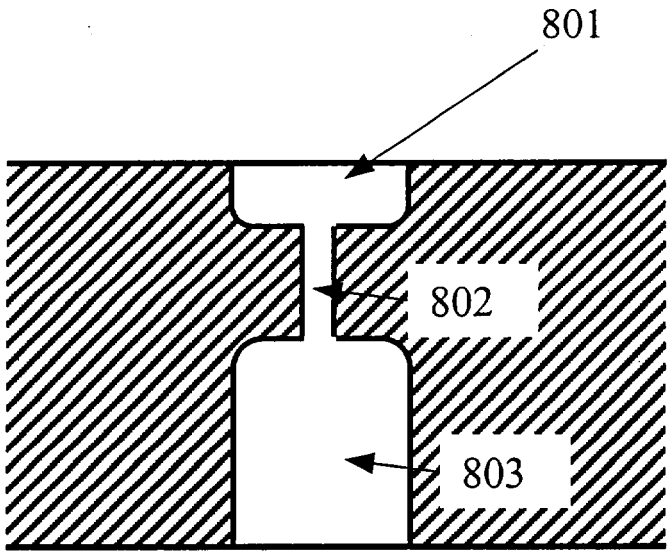

801 – Mixing/reaction well
802 – Flow regulator for reagent metering
803 – Compound reservoir

Fig. 8. Internal structure of a through hole in capillary array compound library

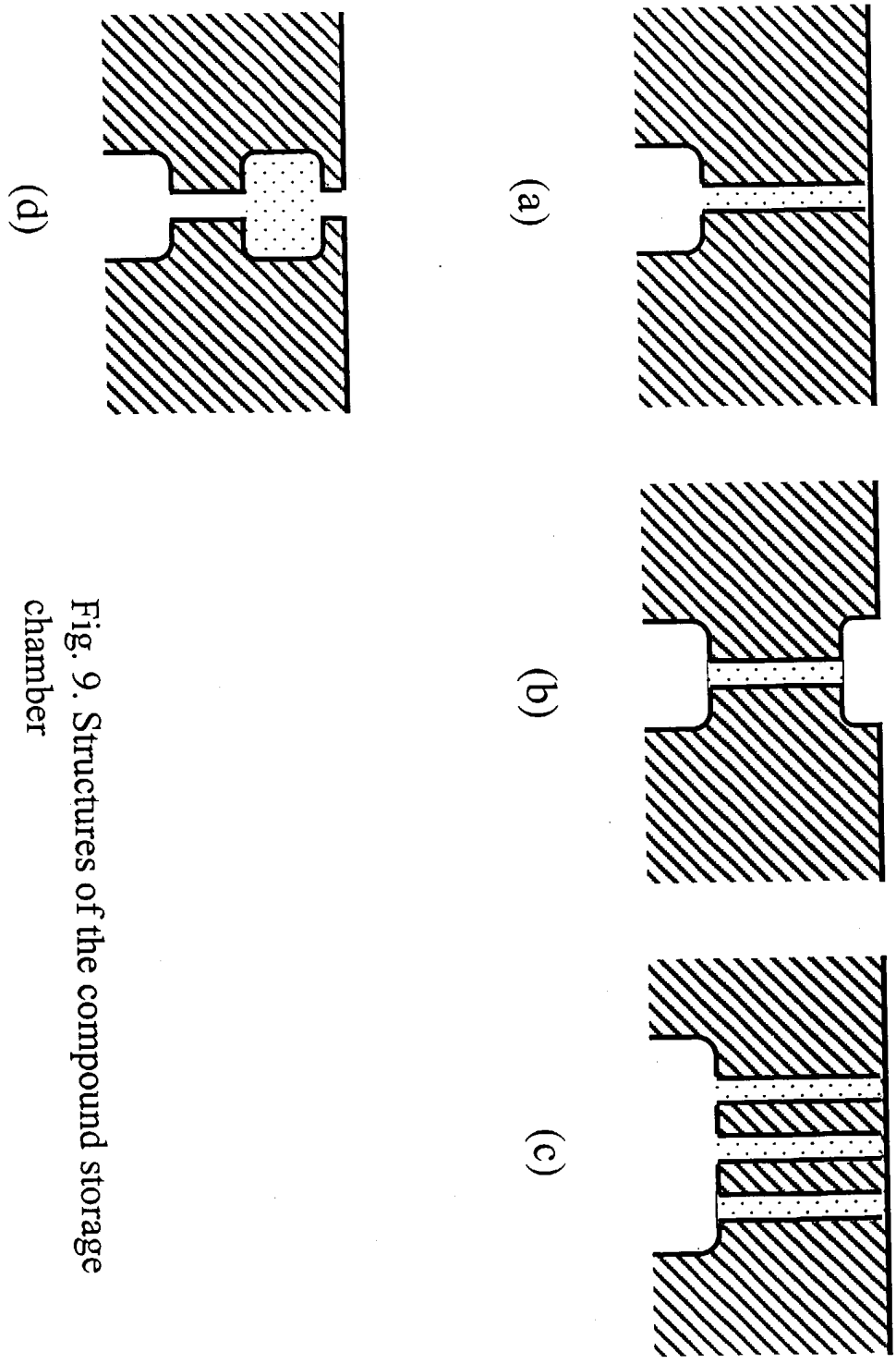

Fig. 9. Structures of the compound storage chamber

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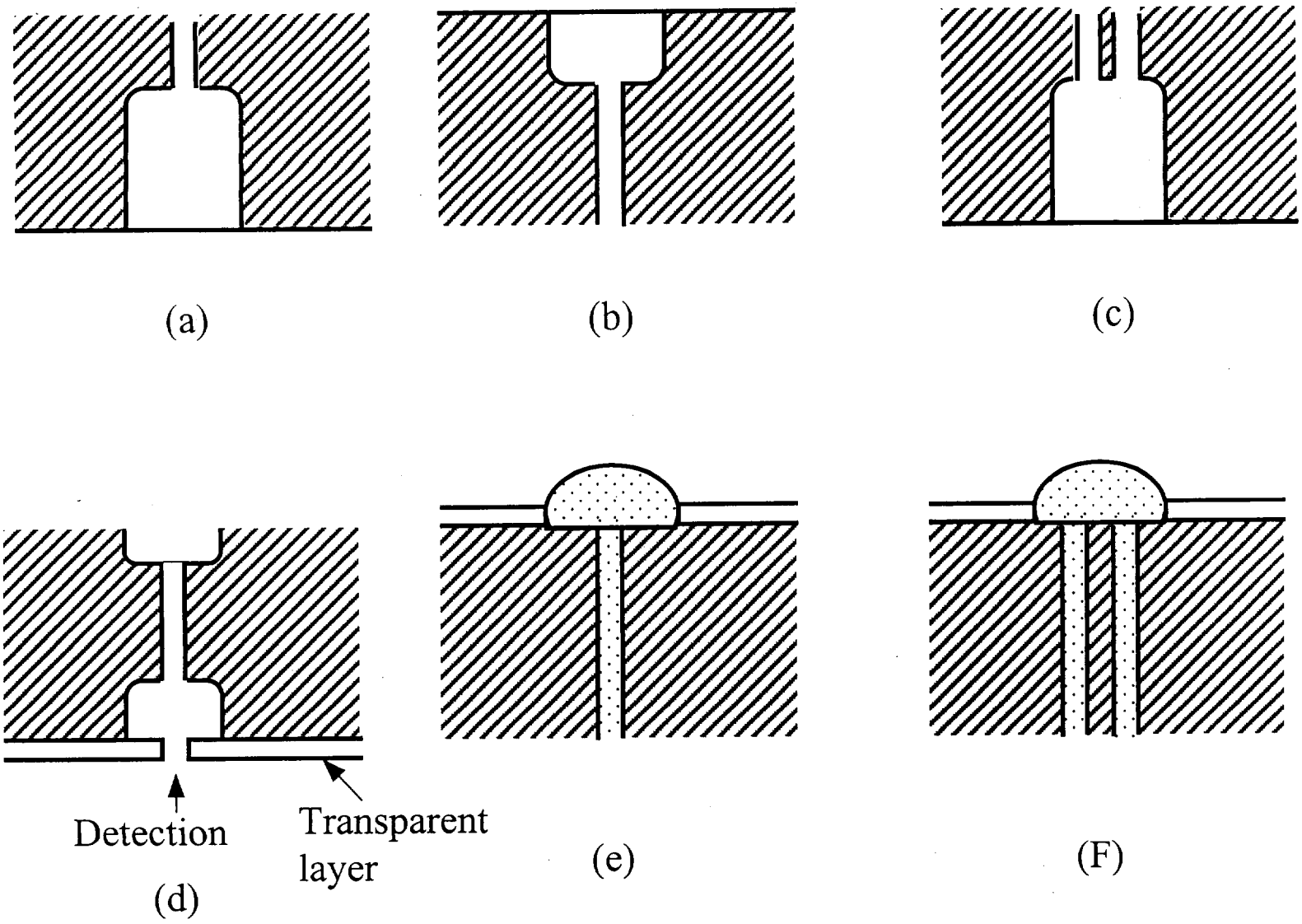

Fig. 10. Internal structures of mixing/reaction chamber

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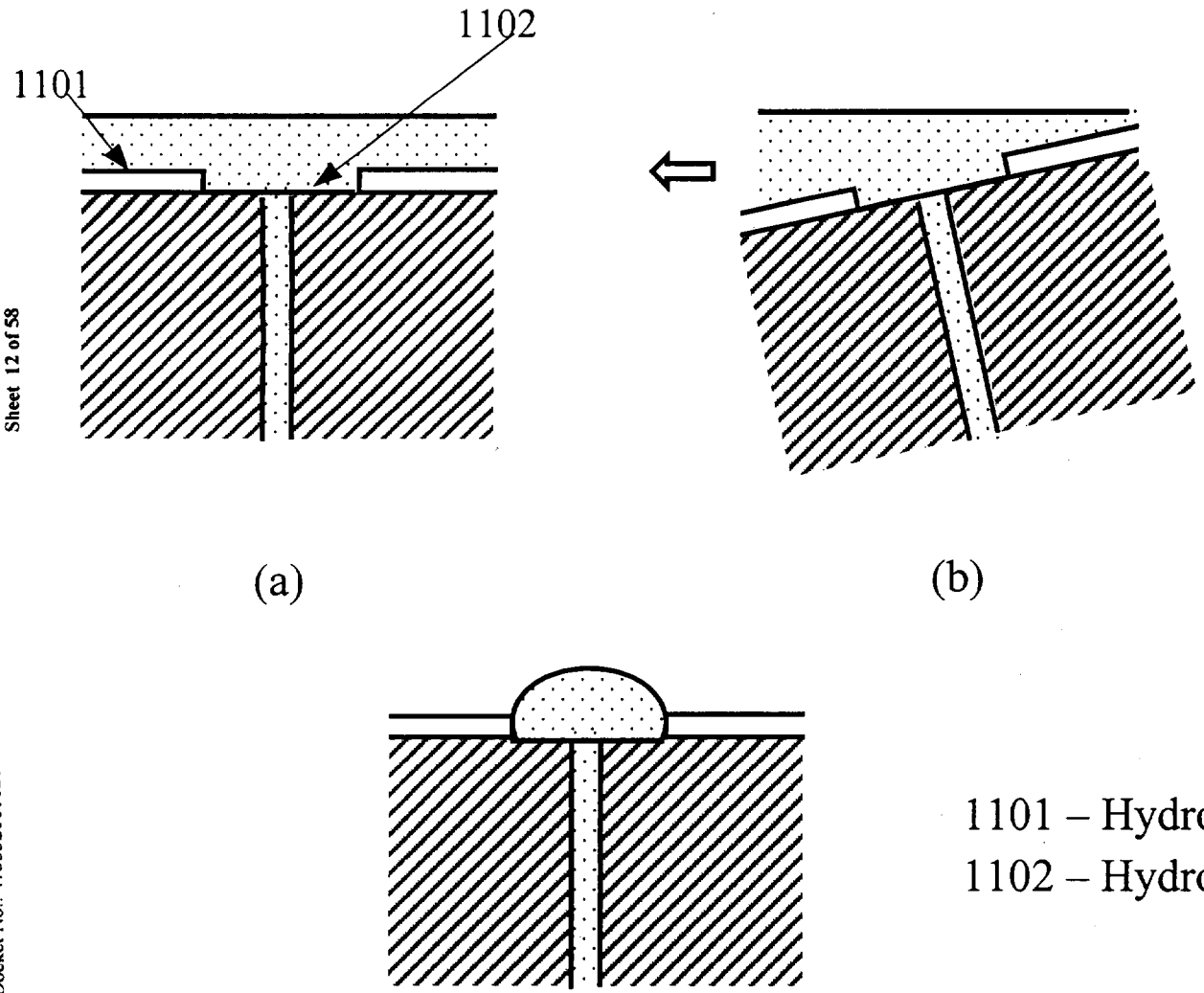

1101 – Hydrophobic coating
1102 – Hydrophilic coating

Fig. 11. Volume metering by surface tension patch

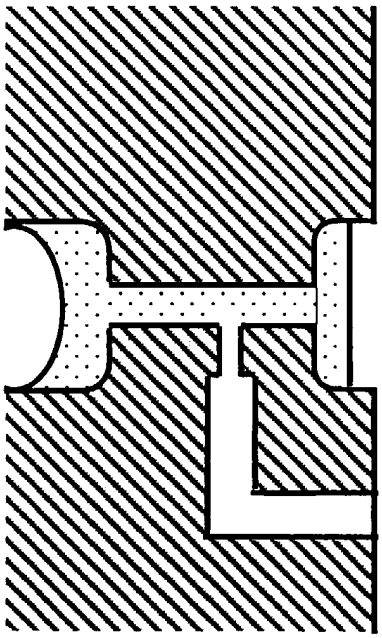

Fig. 12. Fluid regulator with side air tunnel

Title: METH[redacted]ND APPARATUS BASED ON BUNDLED CAPILLARIES FOR HIGH[redacted]JGHPUT SCREENING
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Fig. 13 Internal through hole structures to facilitate chamber volume metering and mixing

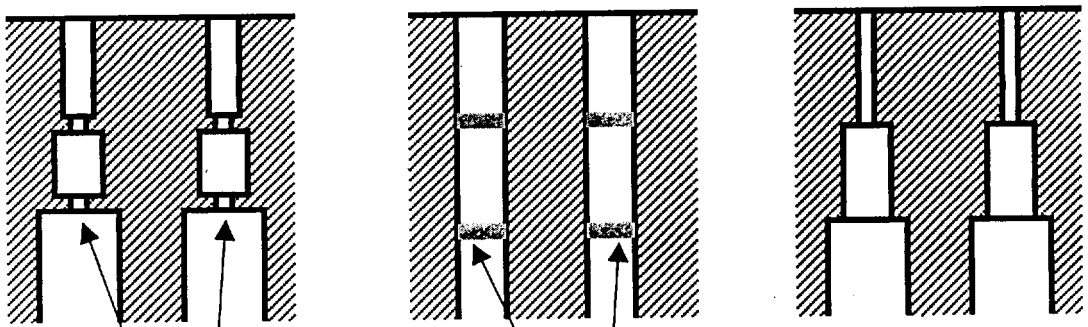

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Fig. 14 Process of metering multiple reagents using interconnected chambers

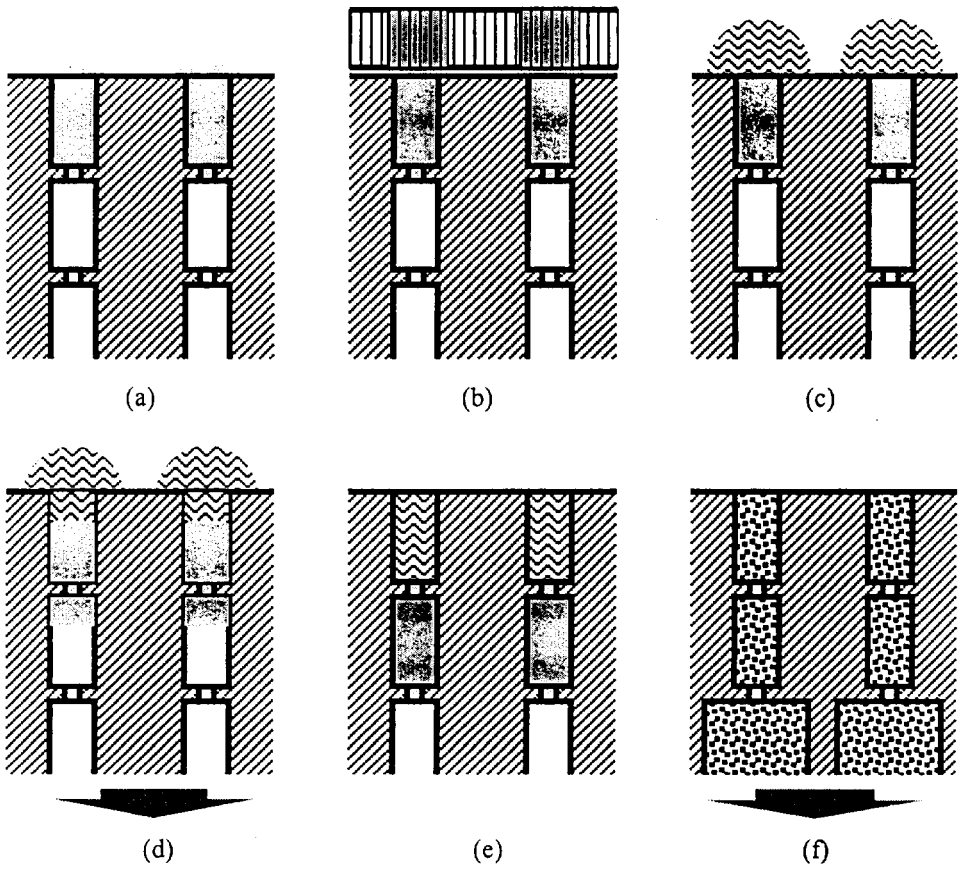

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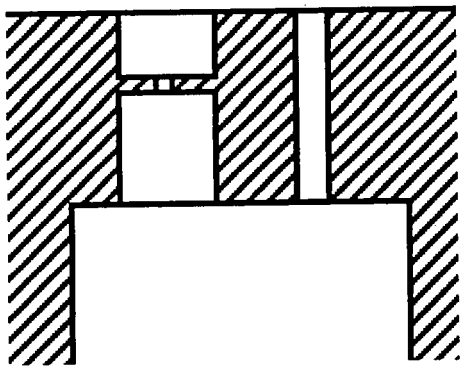
Fig. 15 Special through hole structure where multiple chambers links to a chamber in parallel



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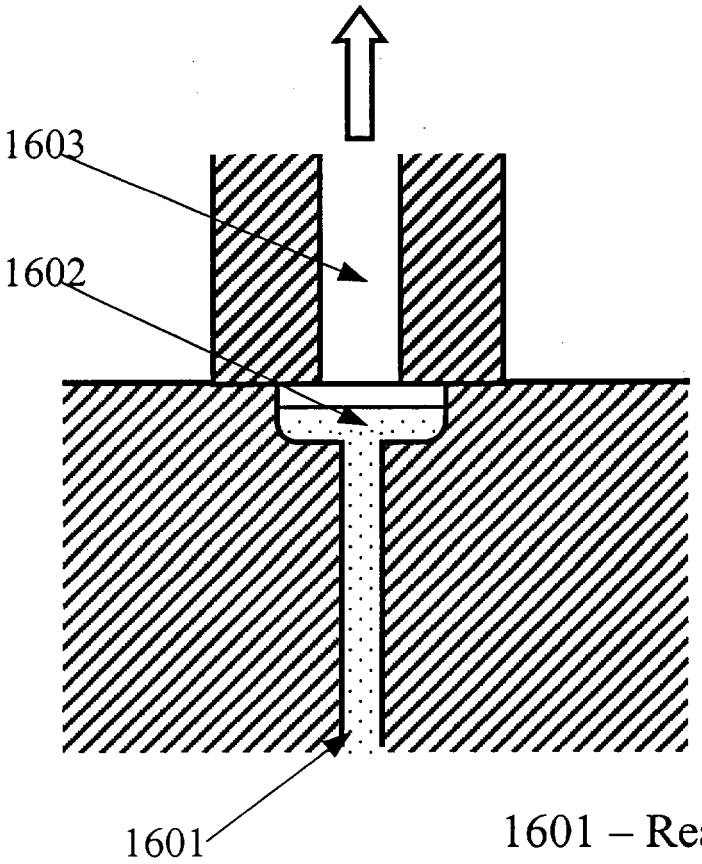

1601 – Reagent volume needed
1602 – excess reagent fluid
1603 - Vacuum

Fig.16. Removal of excess fluid by vacuum

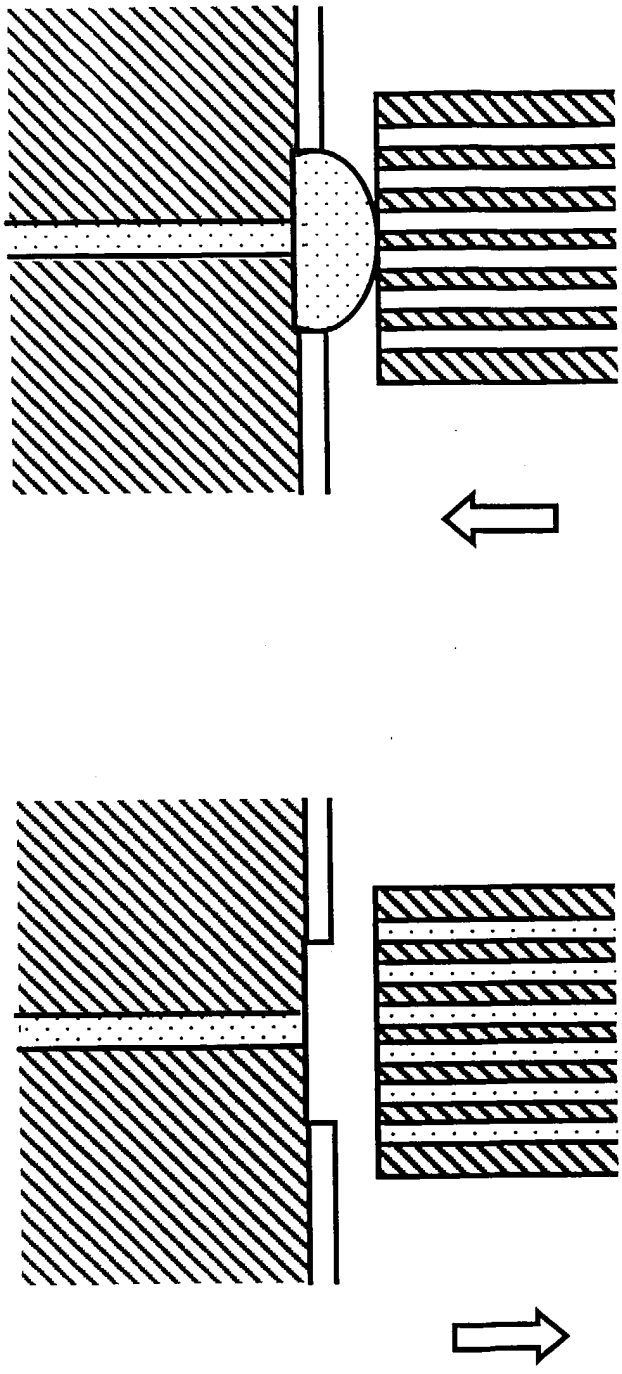

Fig. 17. Excess fluid removal using a second capillary array

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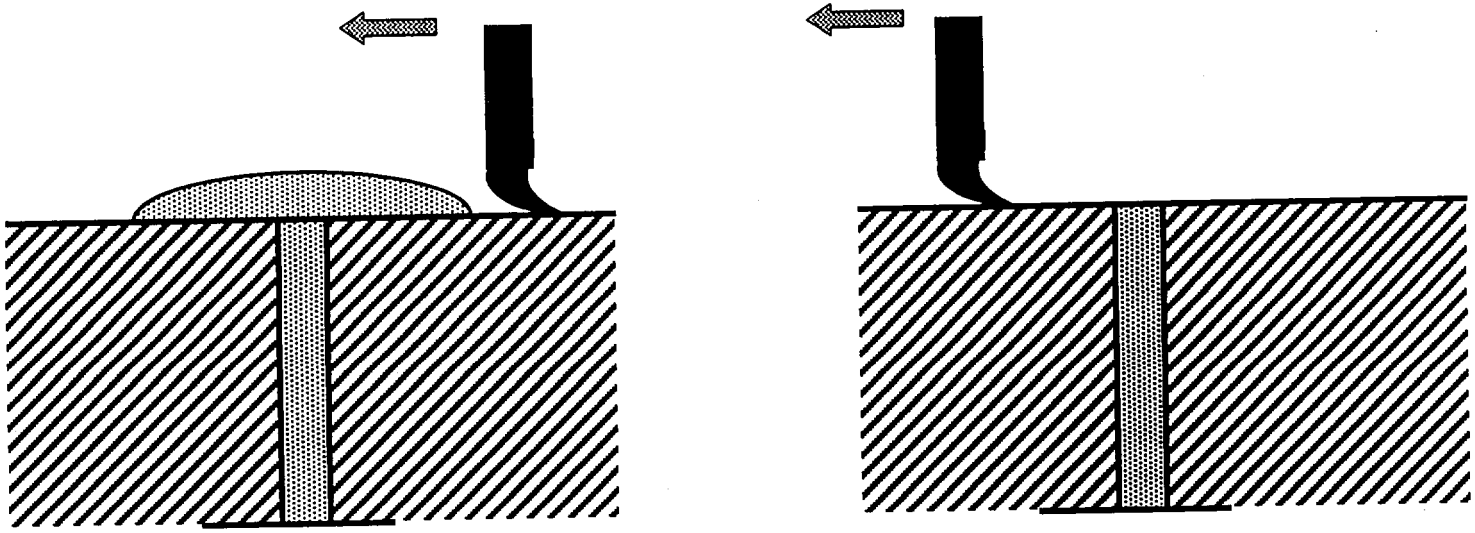
Fig. 18. Excess Fluid Removal by Wiping



a b

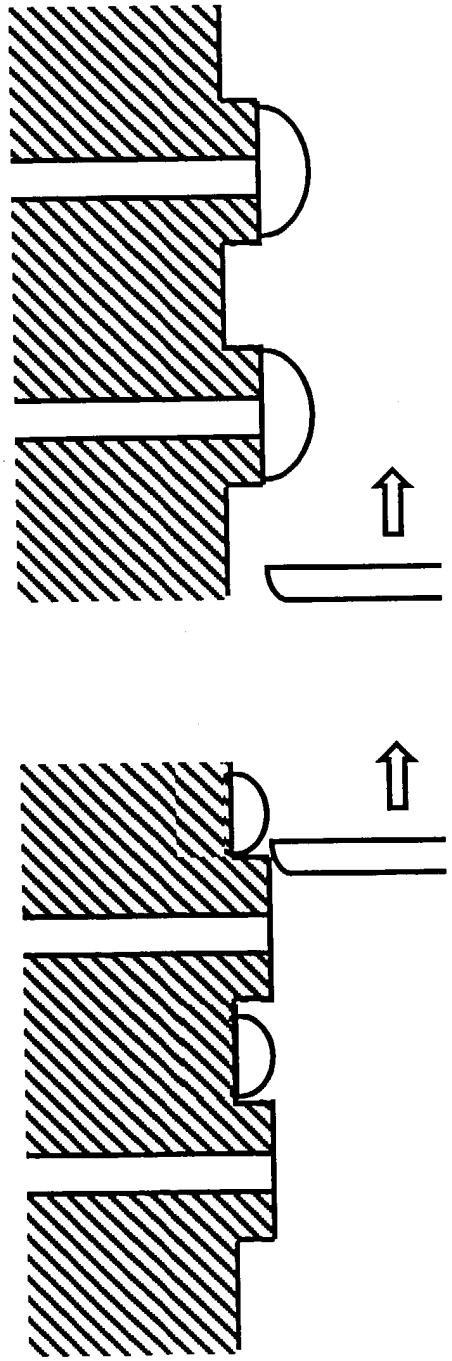


Fig.19. A method for reducing cross-contamination between adjacent holes during excess fluid removal

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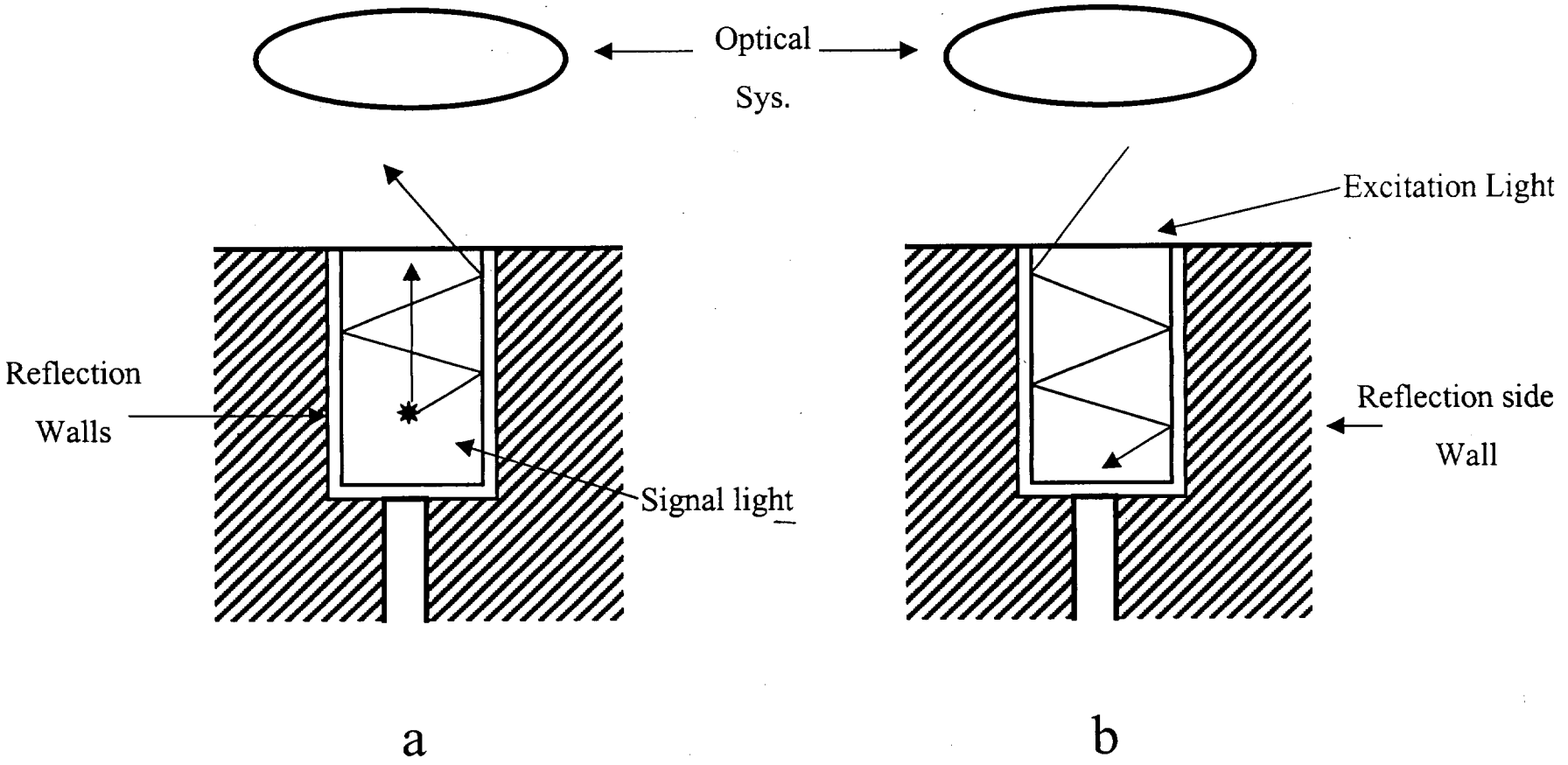
Fig. 20 Use Reflection Wall of Reaction Chamber to Enhance Optical Signal of the Assay



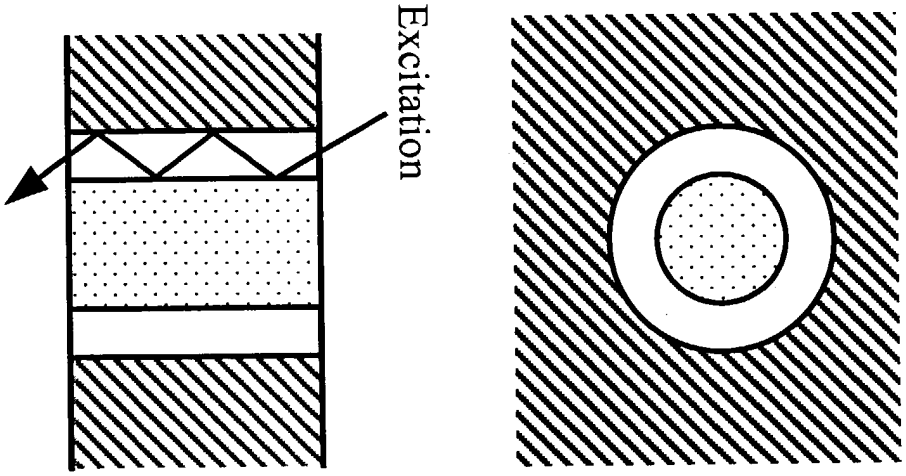


Fig21 Light guiding capillary

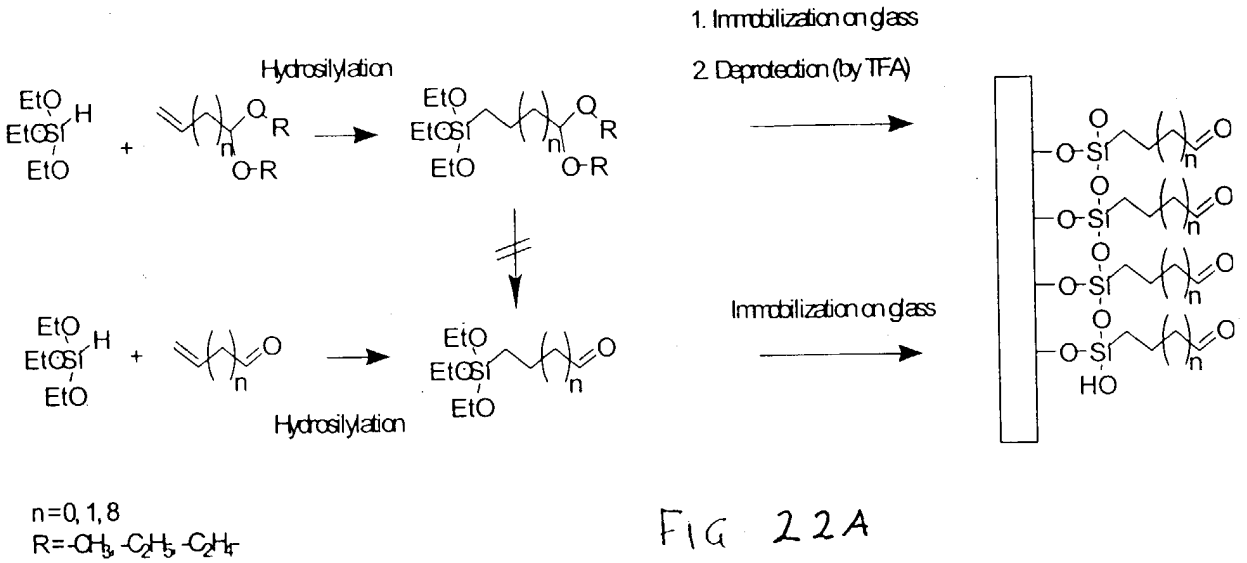


FIG 22A

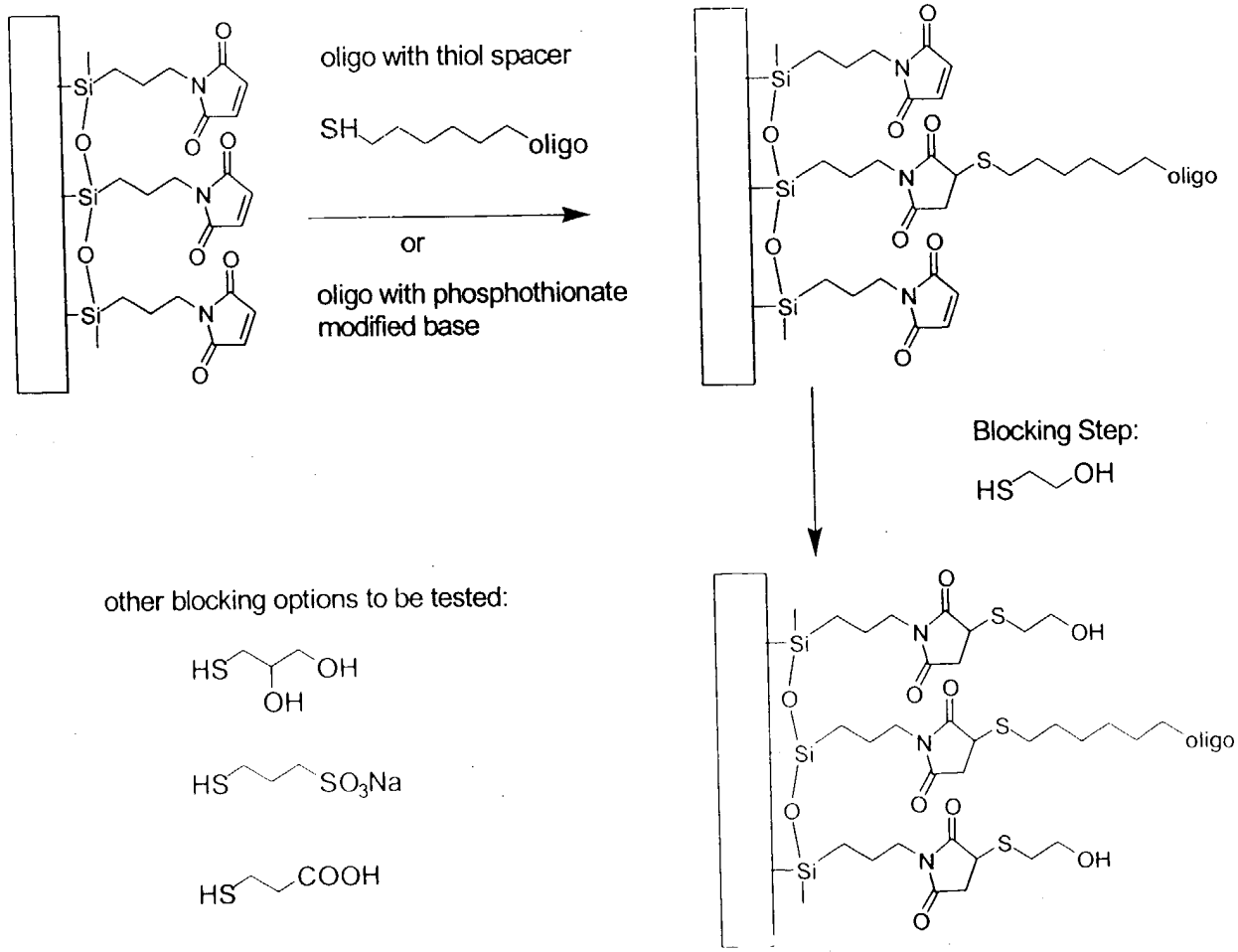


FIG 22B

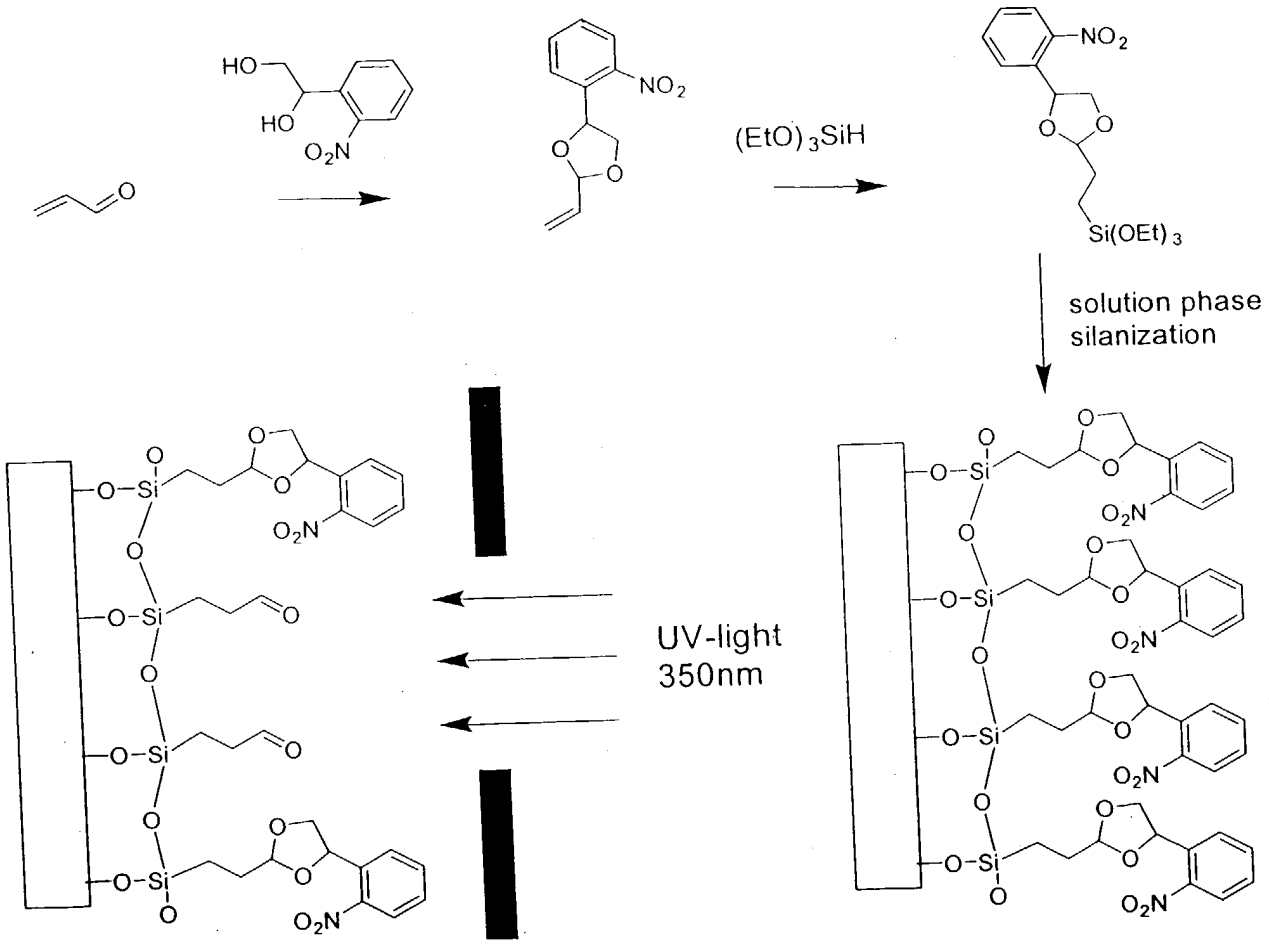

HO
HO
O_2N
NO_2
$(EtO)_3SiH$
NO_2
$Si(OEt)_3$
solution phase
silanization
UV-light
350nm

FIG. 22C

Figure 23 Process for fabrication using a negative mask

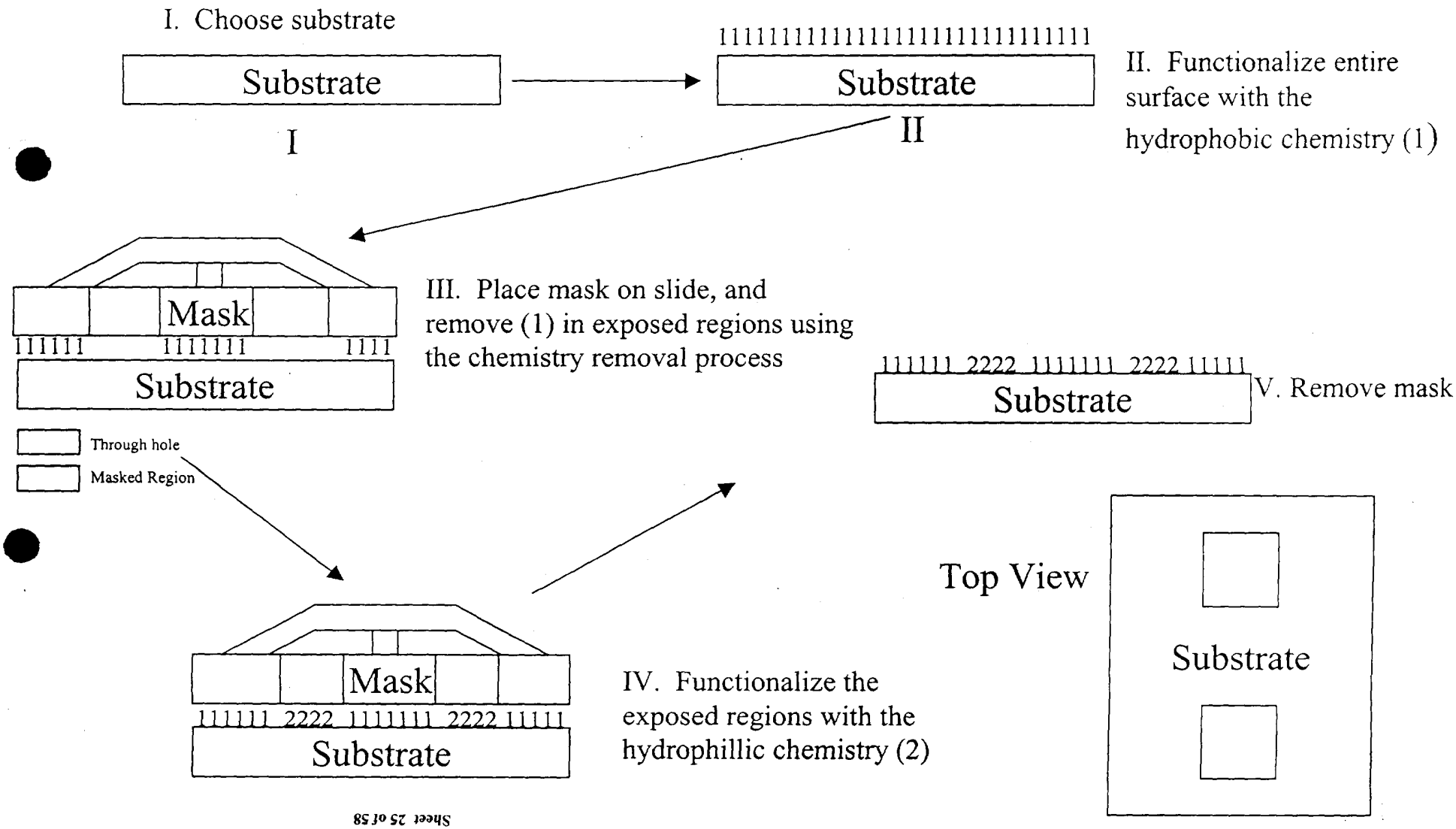


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Figure 24 Process for the fabrication using positive mask

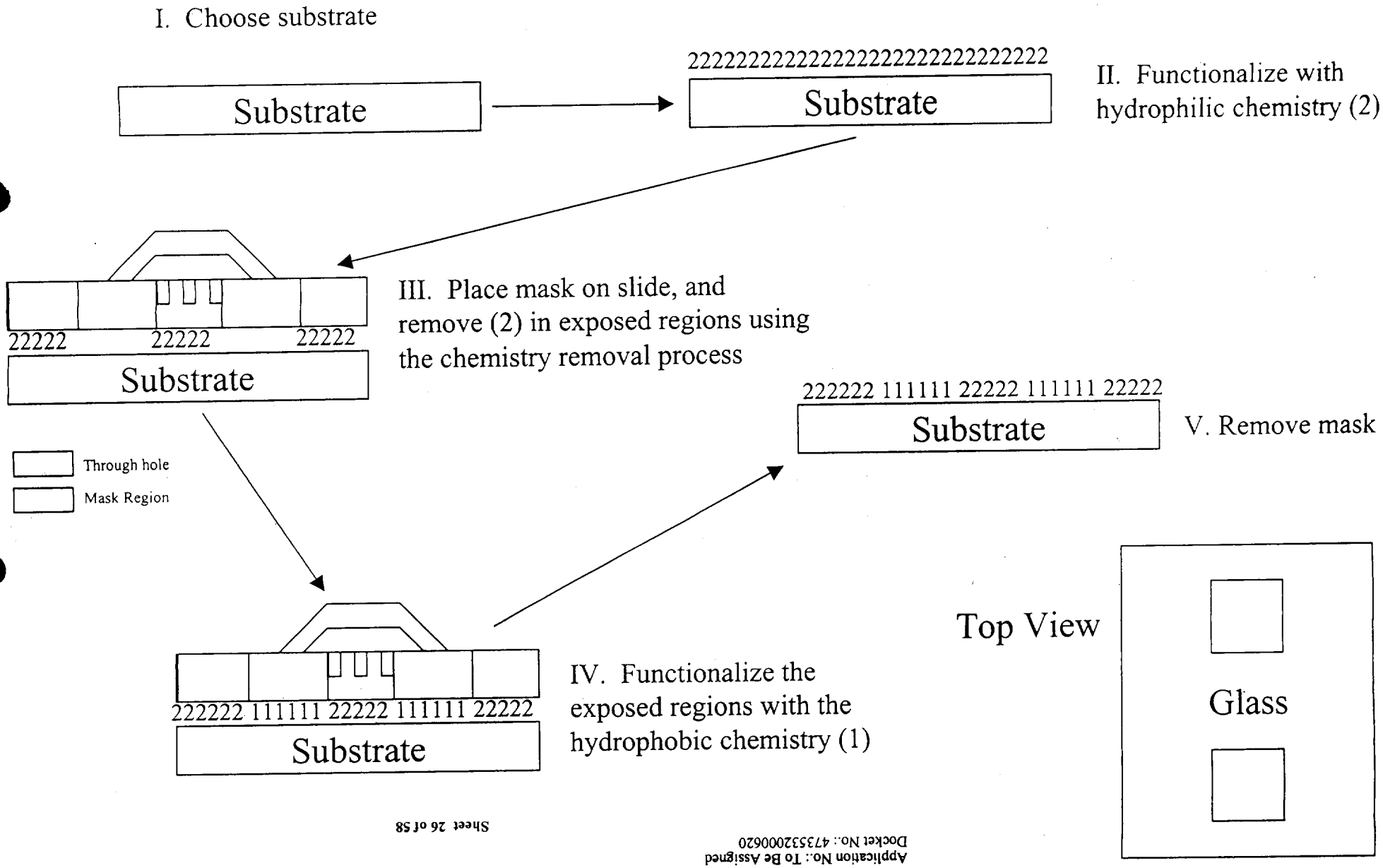

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Figure 25 Chamber use

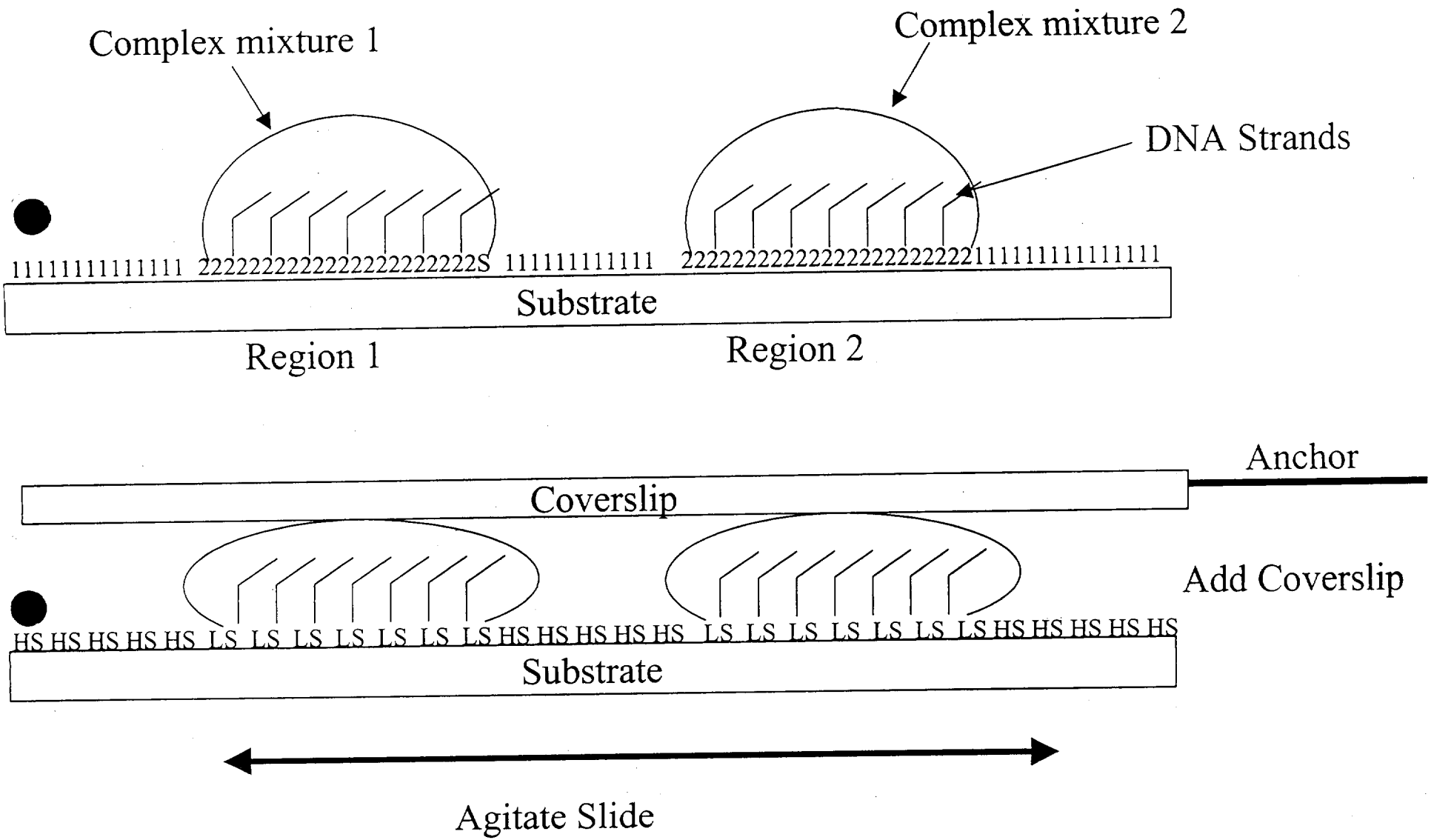

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Figure 26A Surface Tension Patterning: On-capillary Fiber optic based patterning

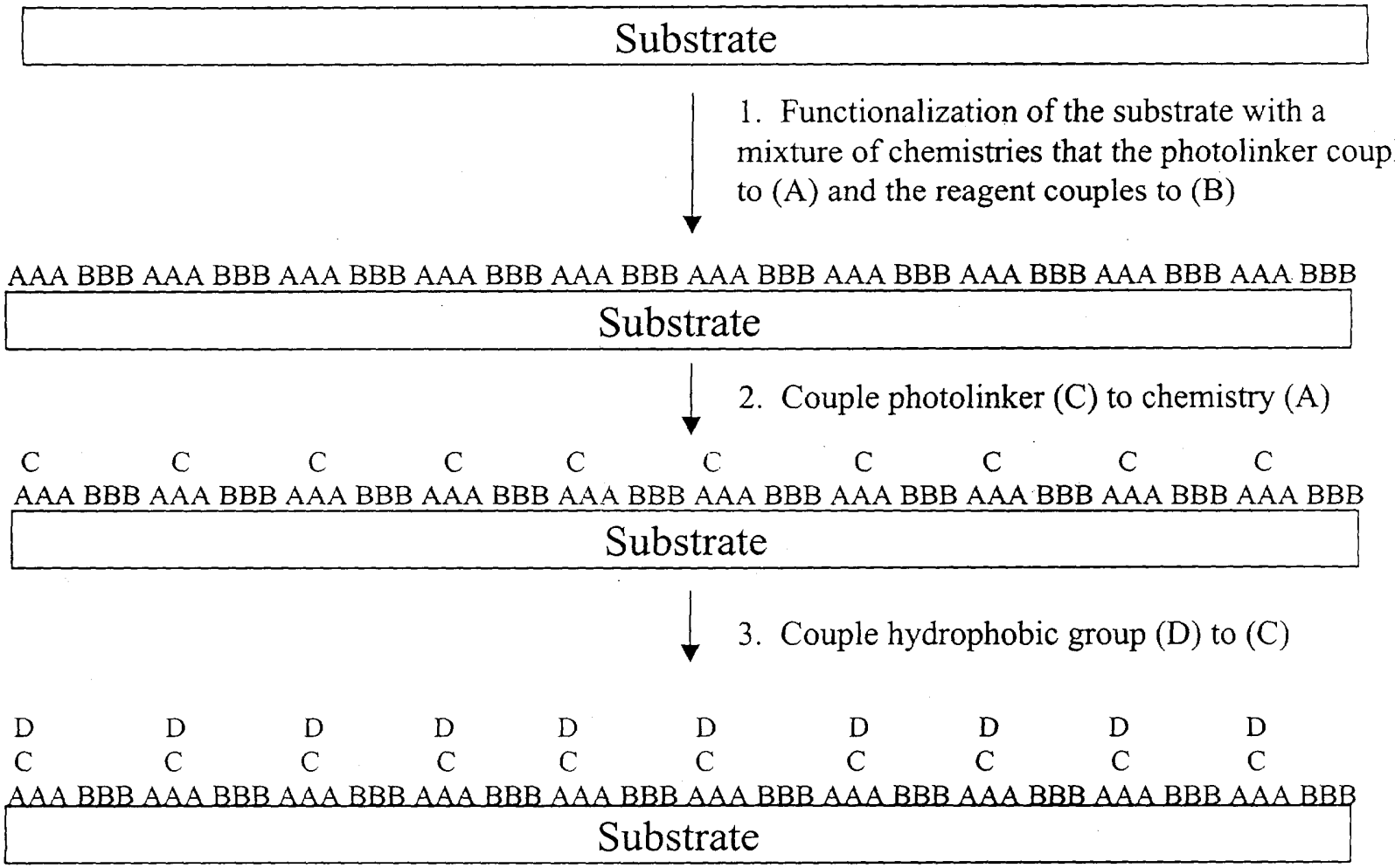

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Figure 26B Surface Tension Patterning: On-capillary Fiber optic based patterning

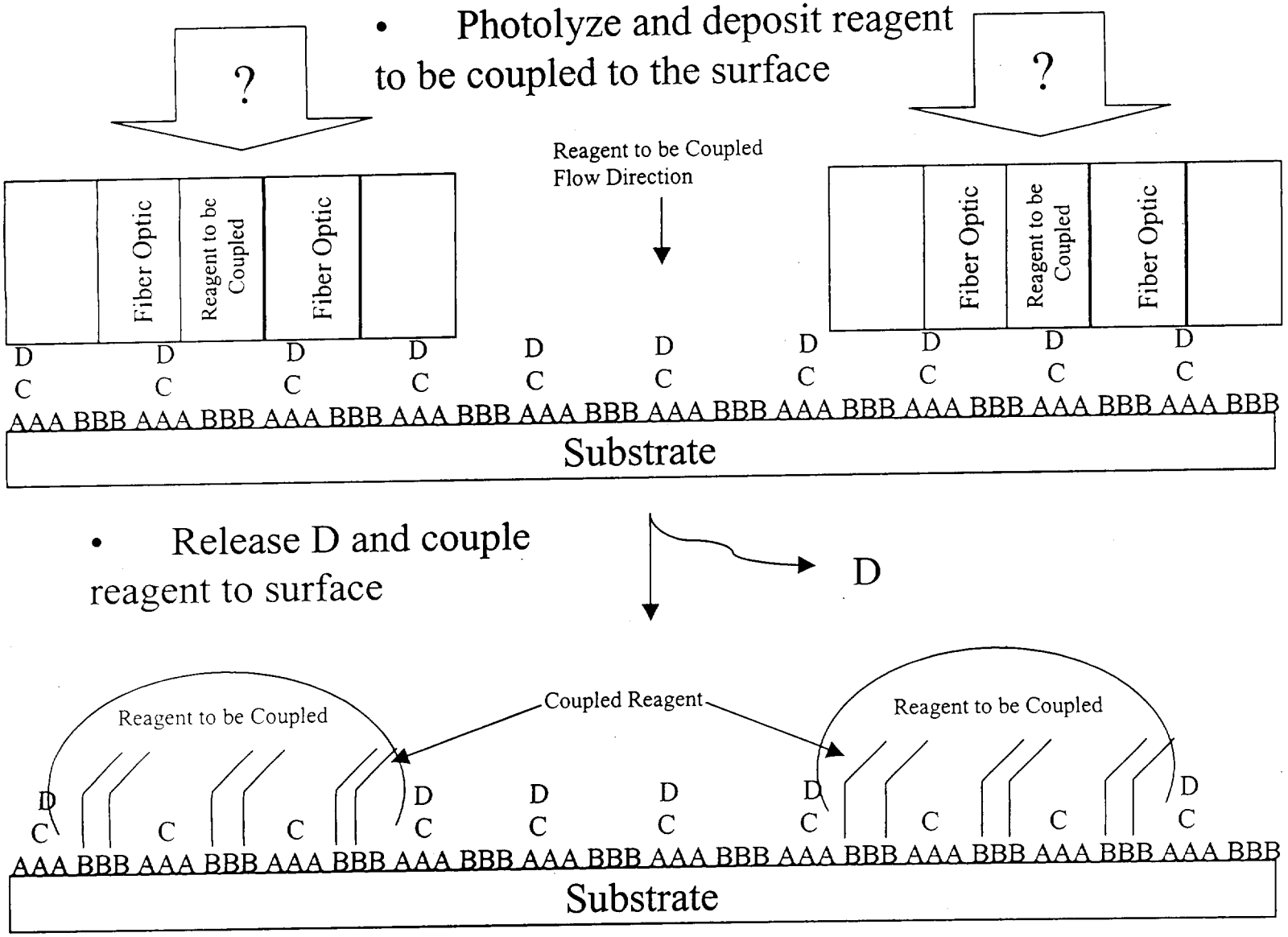

Figure 27A Volume Metering using Surface Tension Features

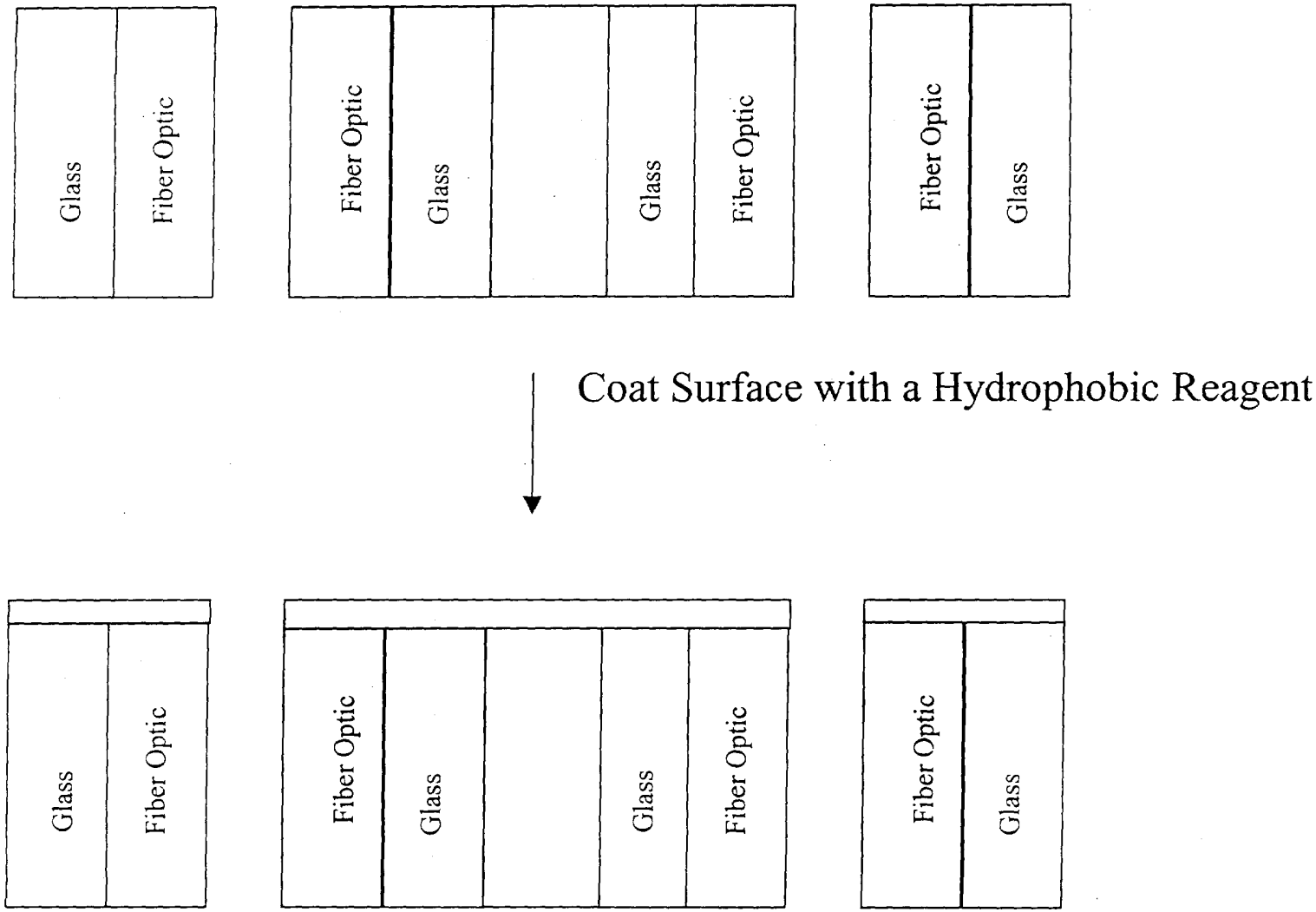

Figure 27B Volume Metering using Surface Tension Features

Place a Mask on to the Surface and Expose the Surface to the Chemistry Removal Process

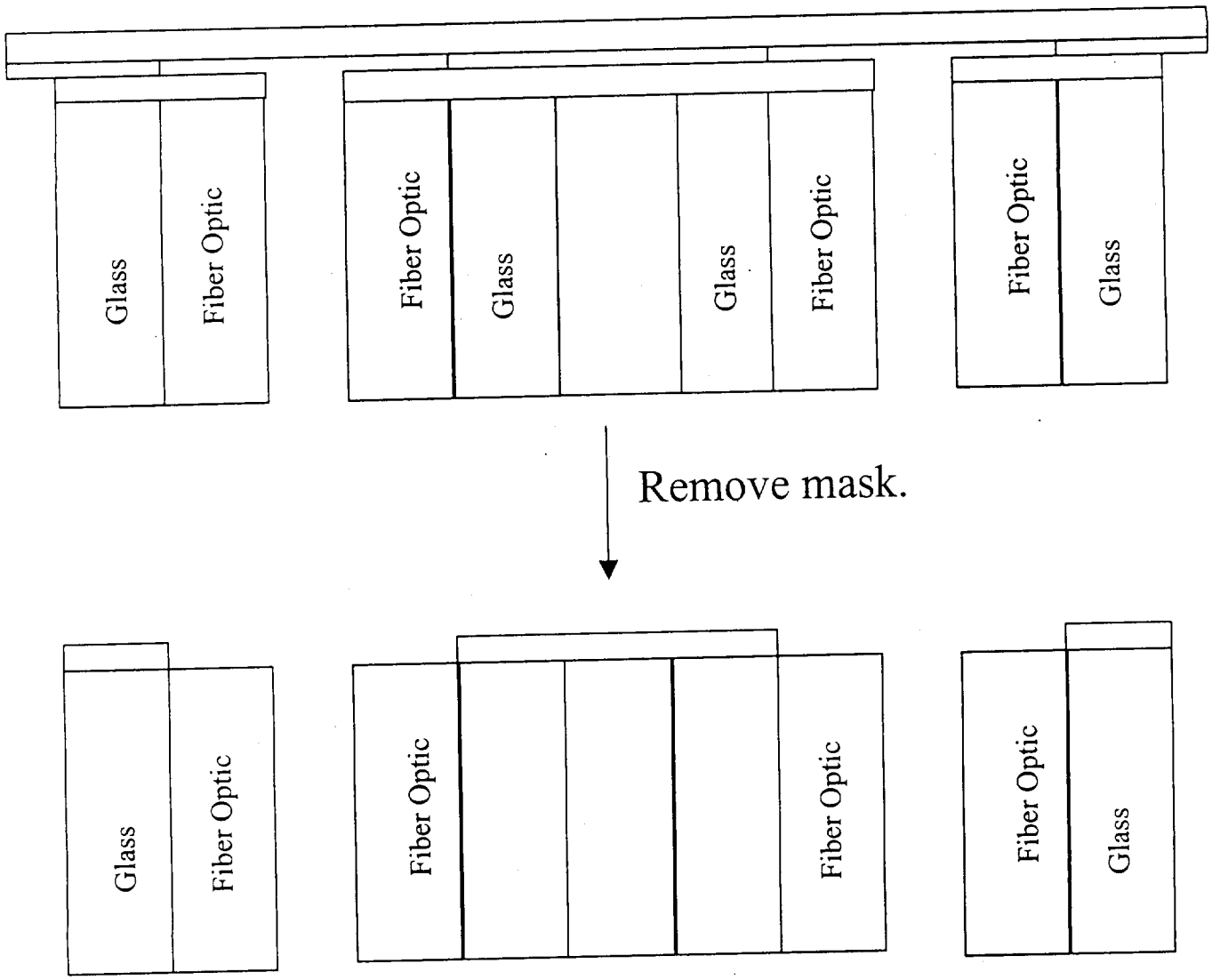

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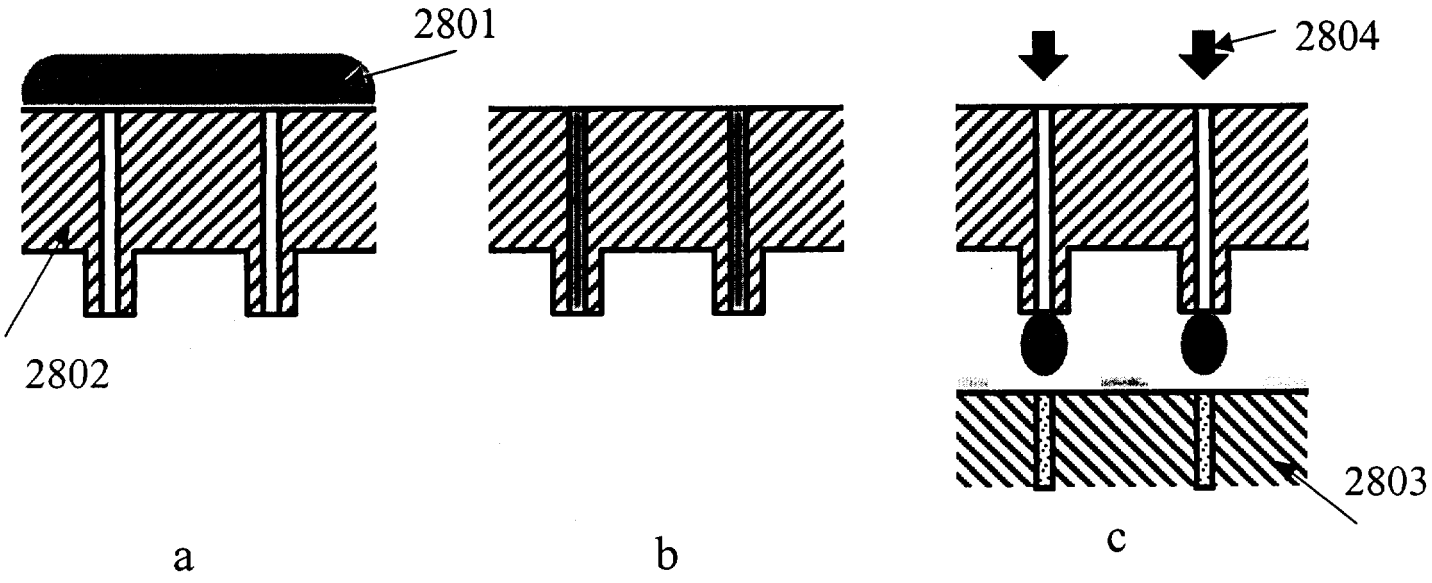
Fig. 28 Reagent pre-metering using an intermediary through-hole array



2801 - reagent fluid applied in excessive;
2802 - intermediary through hole array;
2803 - capillary array compound library;
2804 - pressure

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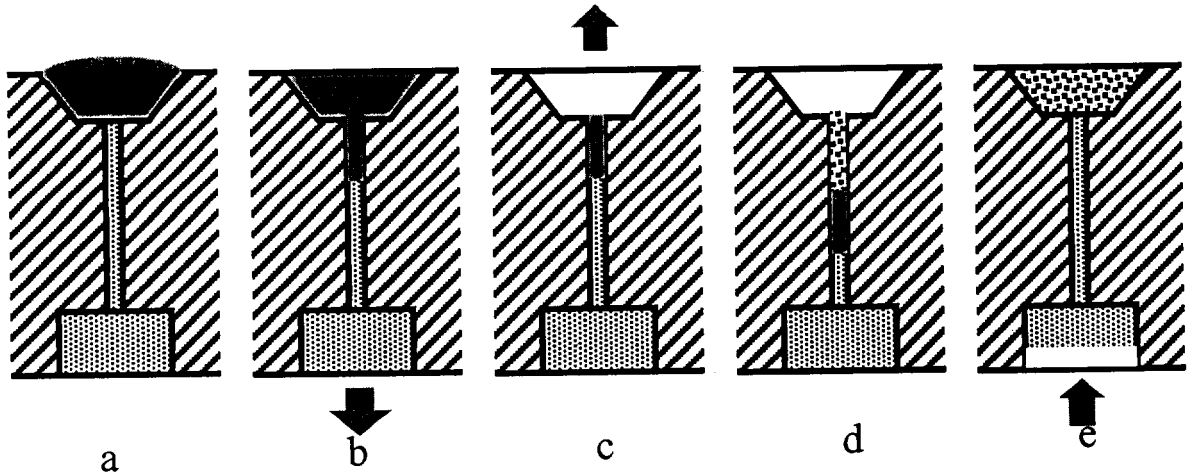
Fig. 29 Metering and mixing with a multi-use capillary array compound library



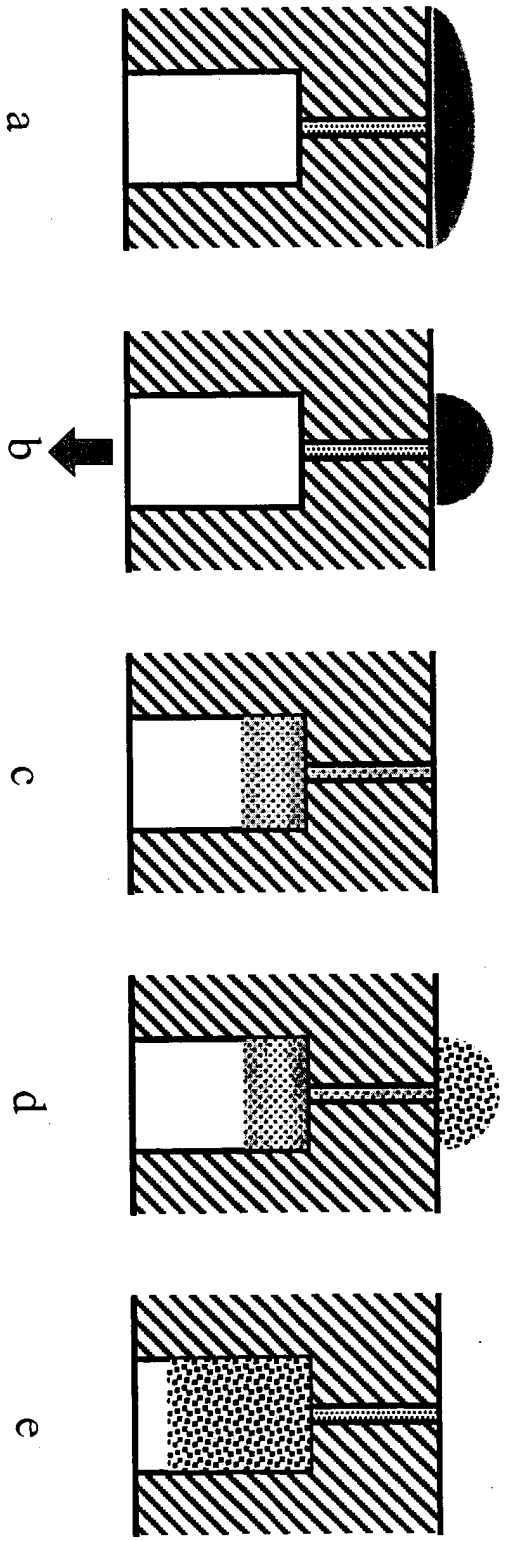


Fig. 30 Metering with hydrophilic patch and mixing

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Fig. 31 Mixing and metering with interconnected chambers

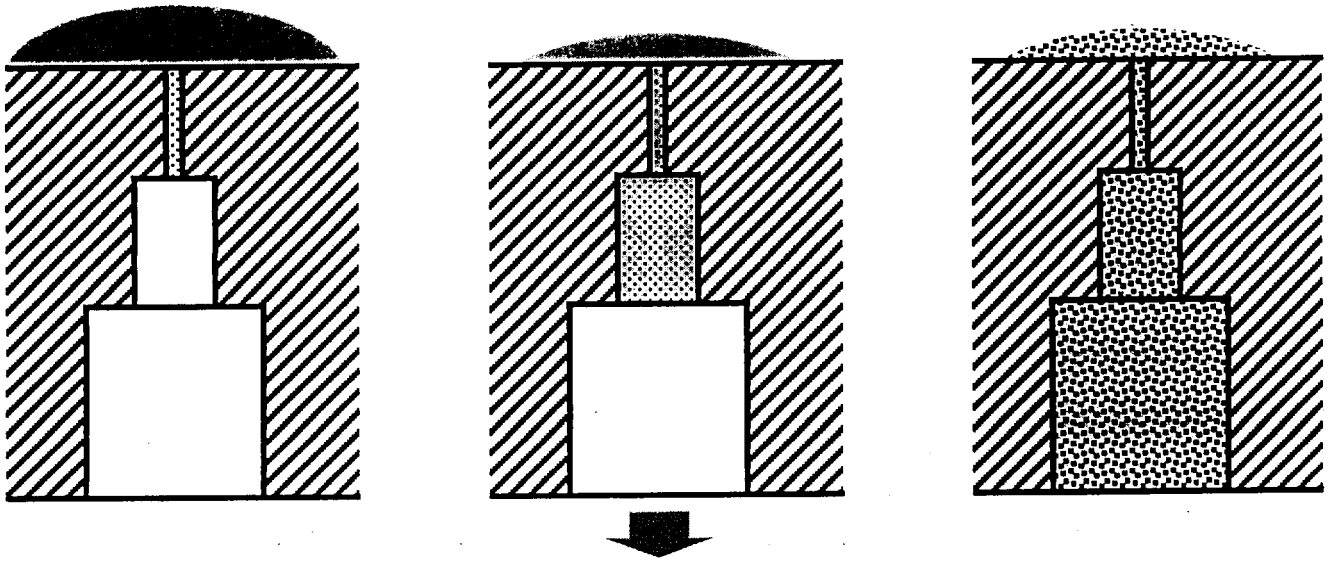

Fig. 32 Heterogeneous Assay

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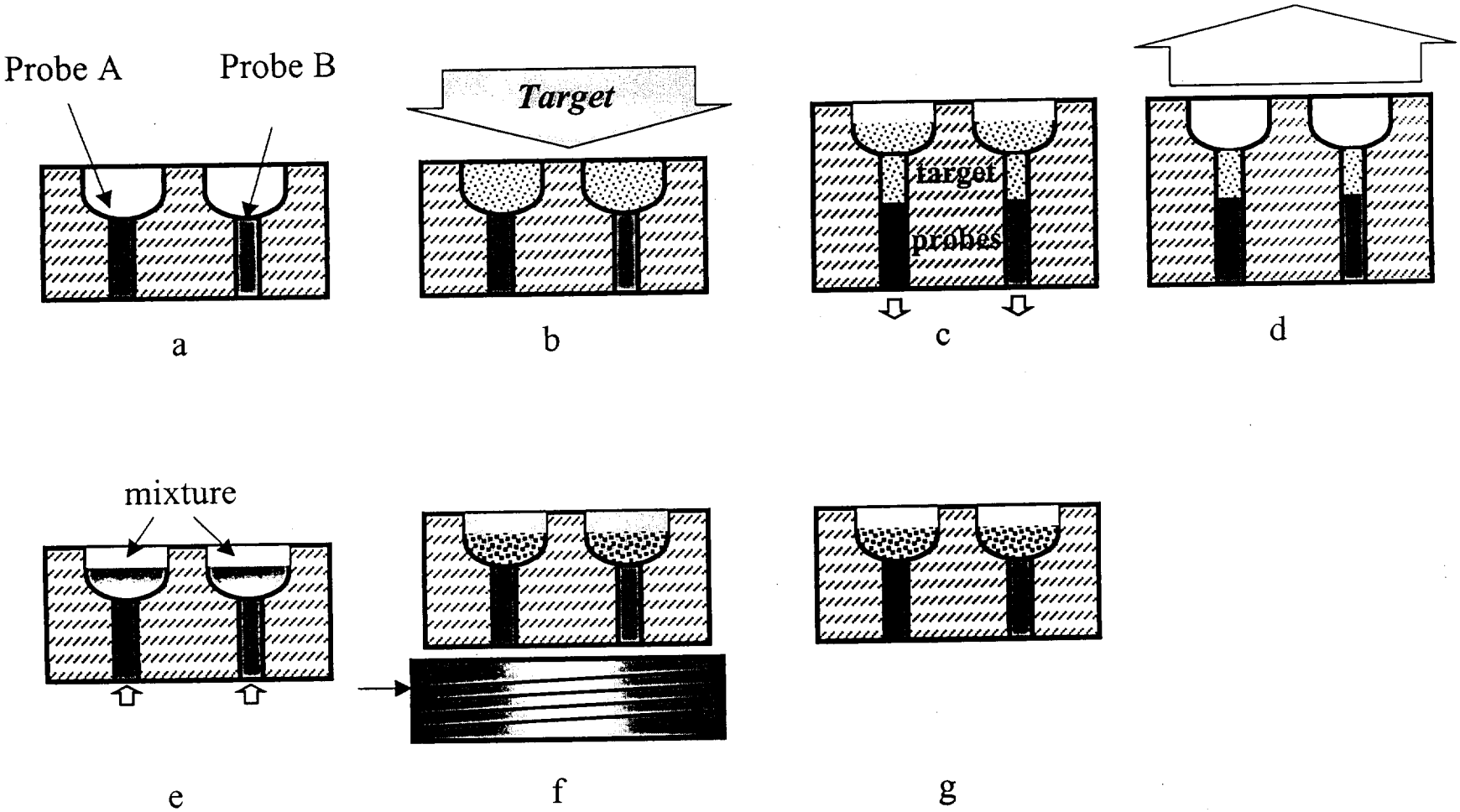
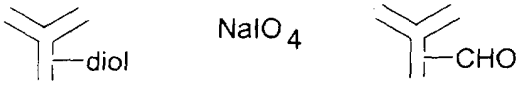
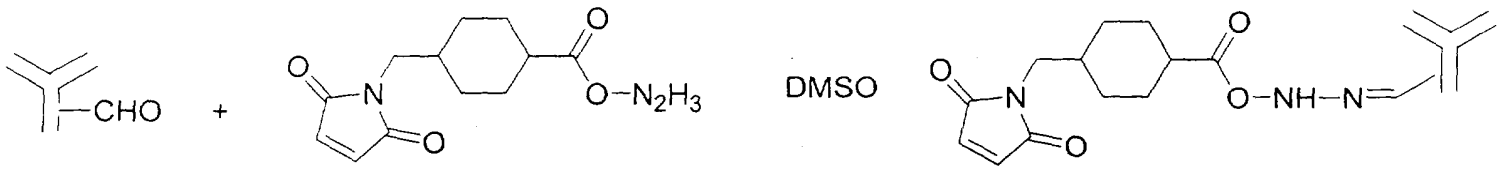


Antibody Immobilization via the Carbohydrate Moiety

1. Oxidation of antibodies vicinal diol group to its aldehyde



2. Conjugation of maleimide moiety with antibody



3. Immobilization of the modified antibody to the surface.

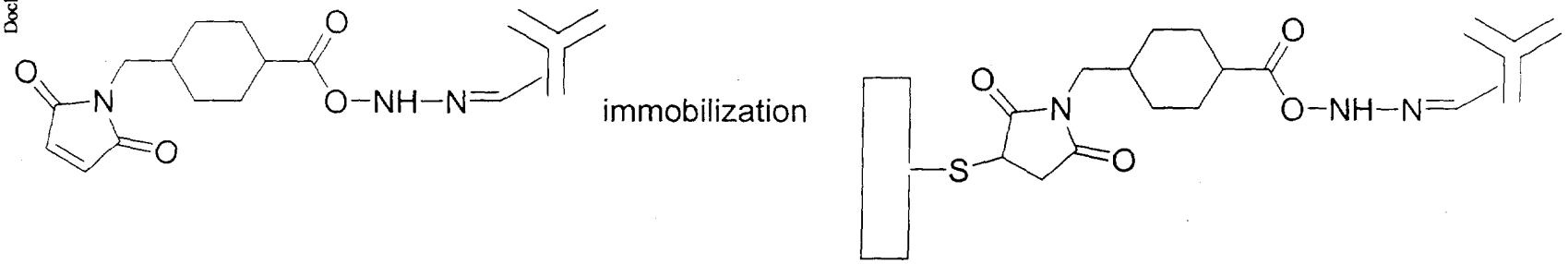
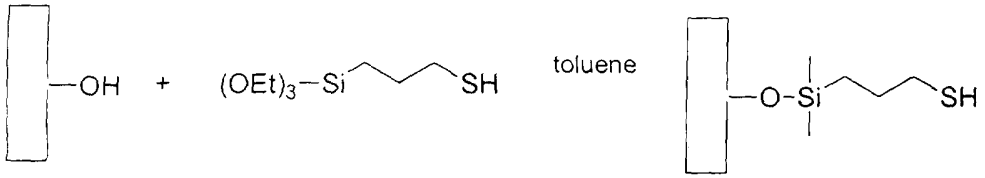


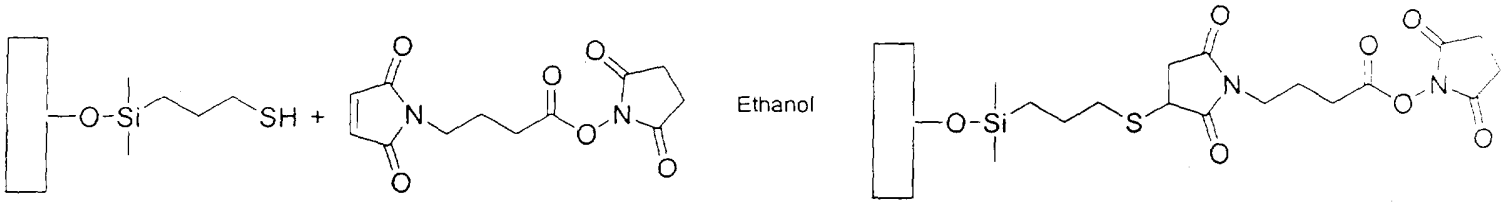
FIG. 33A

Immobilization via Amine Goups

1. Hydrosilylation of (3-mercaptopropyl)triethoxysilane on the surface of fiber



2. Formation of a thioether bond



3. Attachment of fiber to antibody

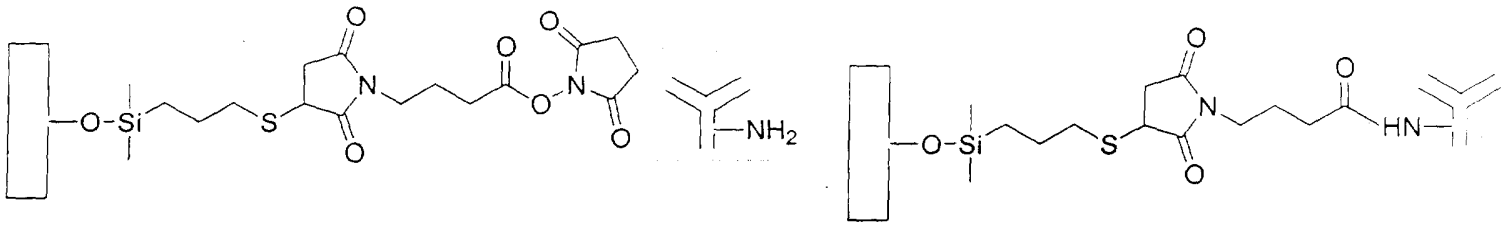


FIG 33B

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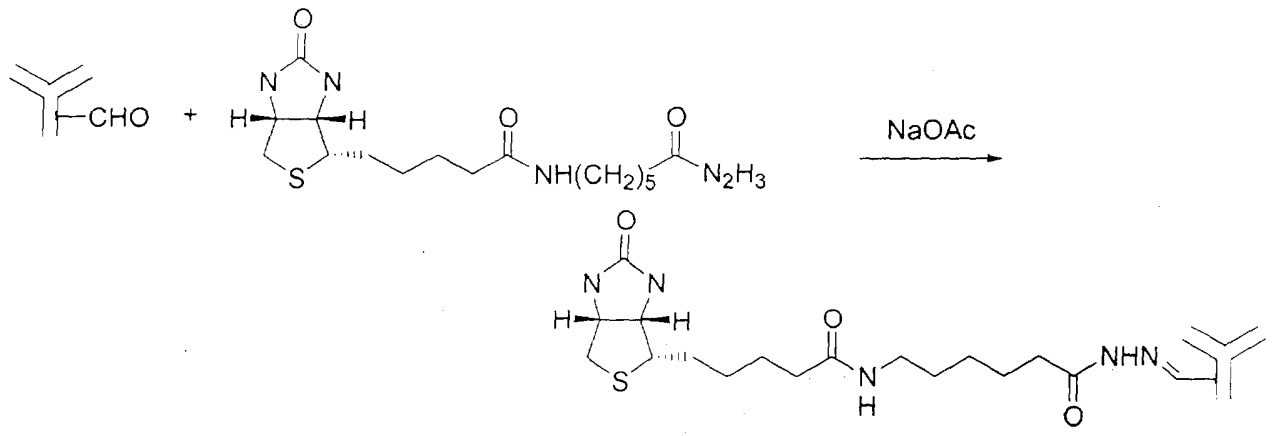
Antibody Immobilization via Streptavidin

1. Label antibody with biotin



2. Modification of fiber surface with biotin maleimide

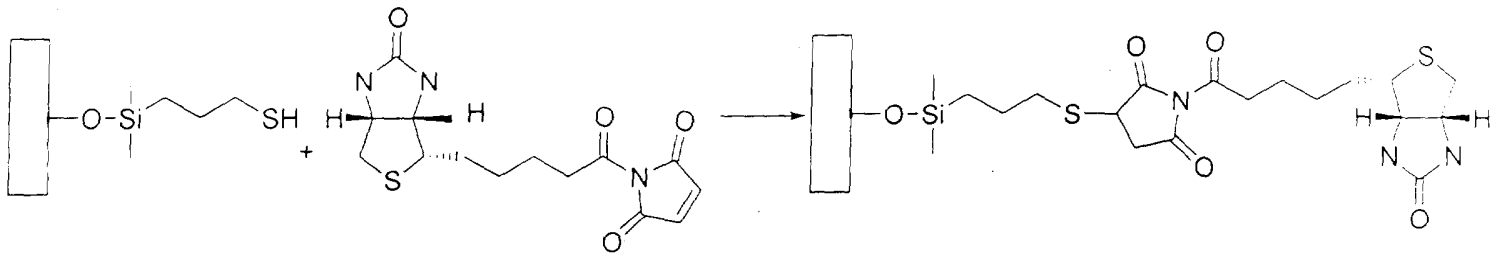


FIG 33c

Title: METHOD AND APPARATUS BASED ON ... FOR HIGH THROUGHPUT SCREENING
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Application No.: To Be Assigned
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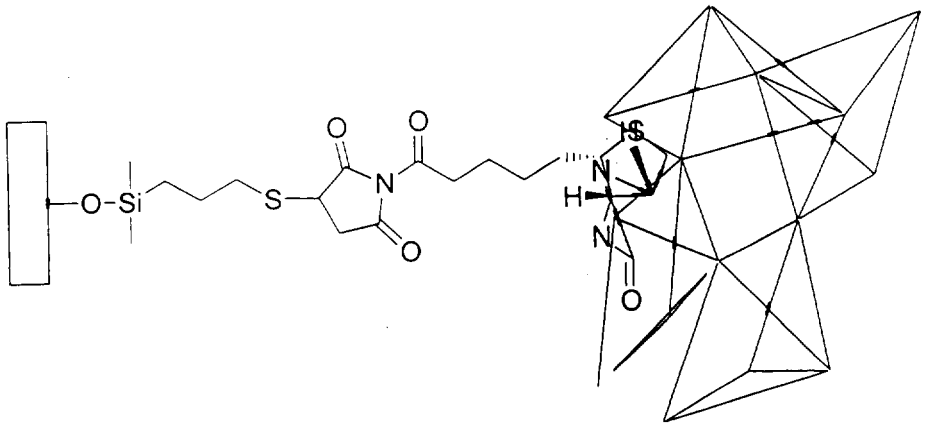
Antibody Immobilization via Streptavidin

3. Conjugate Streptavidin to the surface



4. Conjugate Biotin Anitbody to the surface

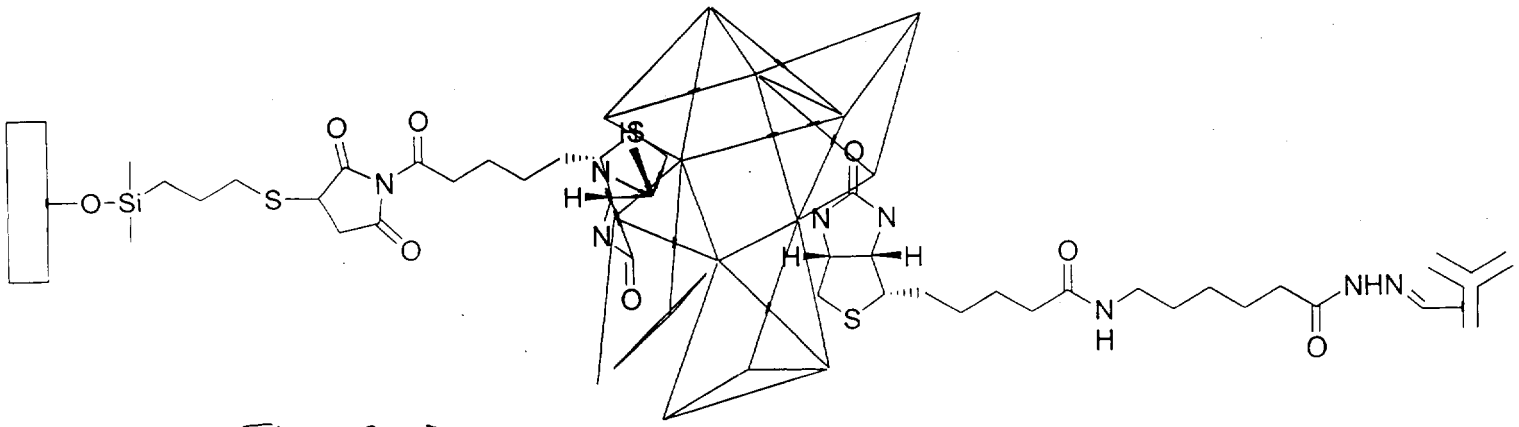
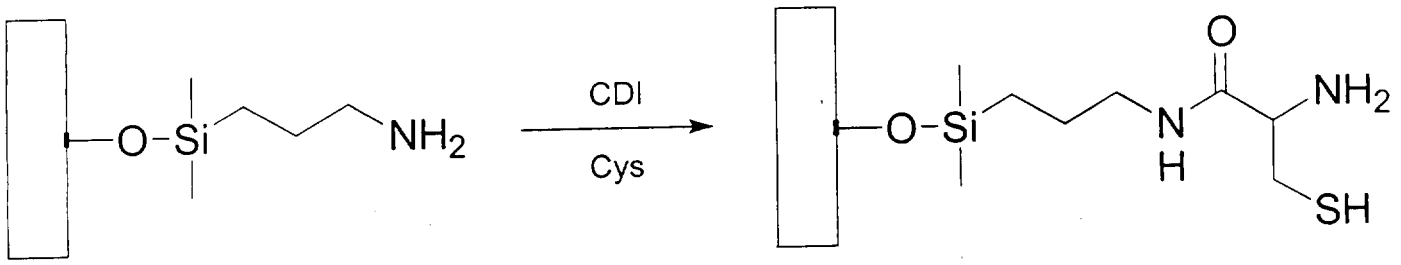


FIG. 33D

Formation of thiazolidine

1. Surface attachment and formation of the linker



2. Thiazolidine formation

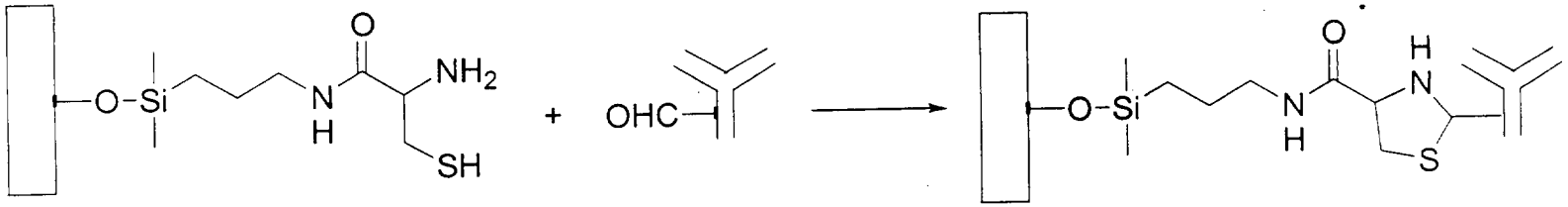


FIG. 33E

Figure 34 Capillary Based Receptor Binding Assay: Non-equilibrium

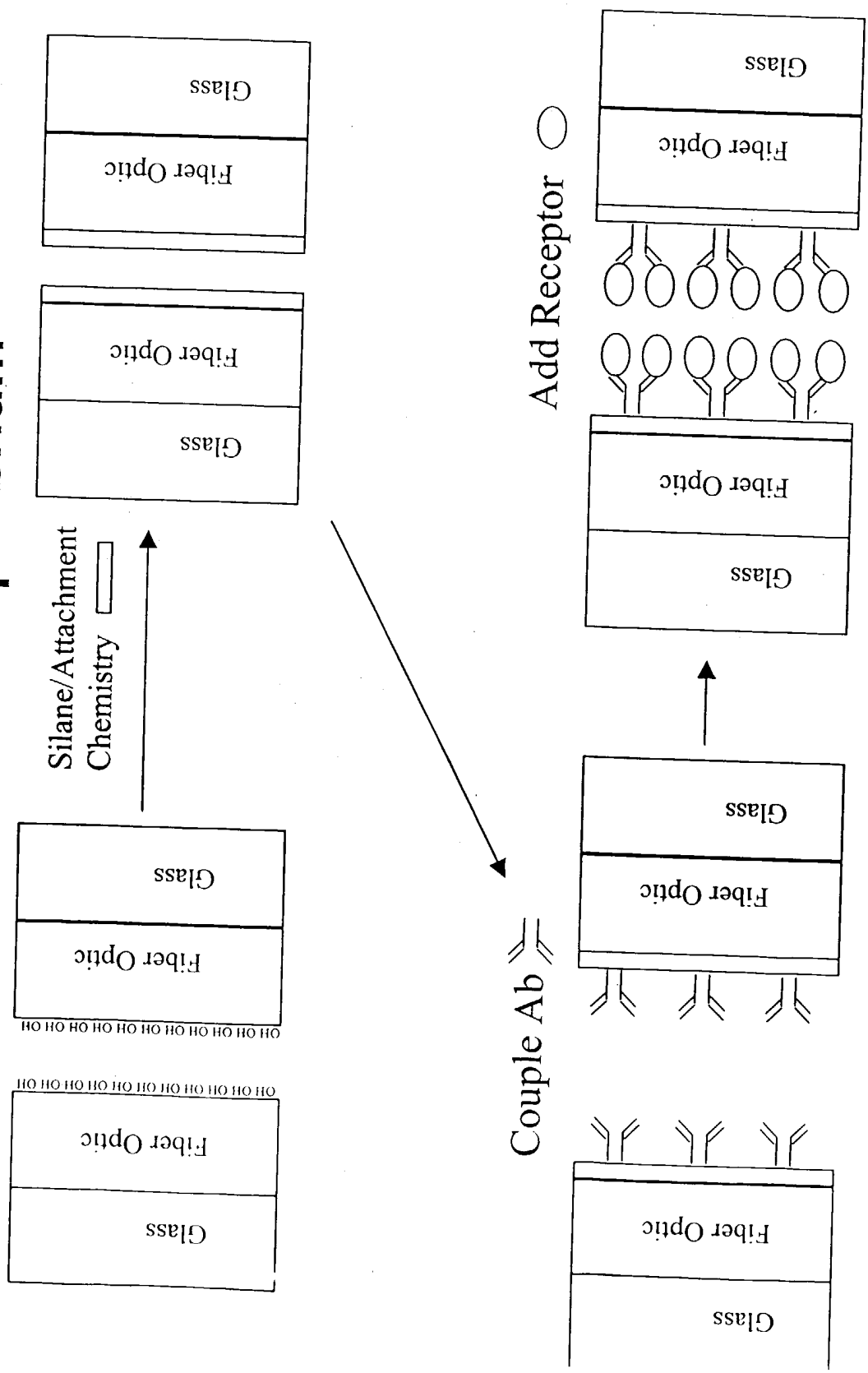
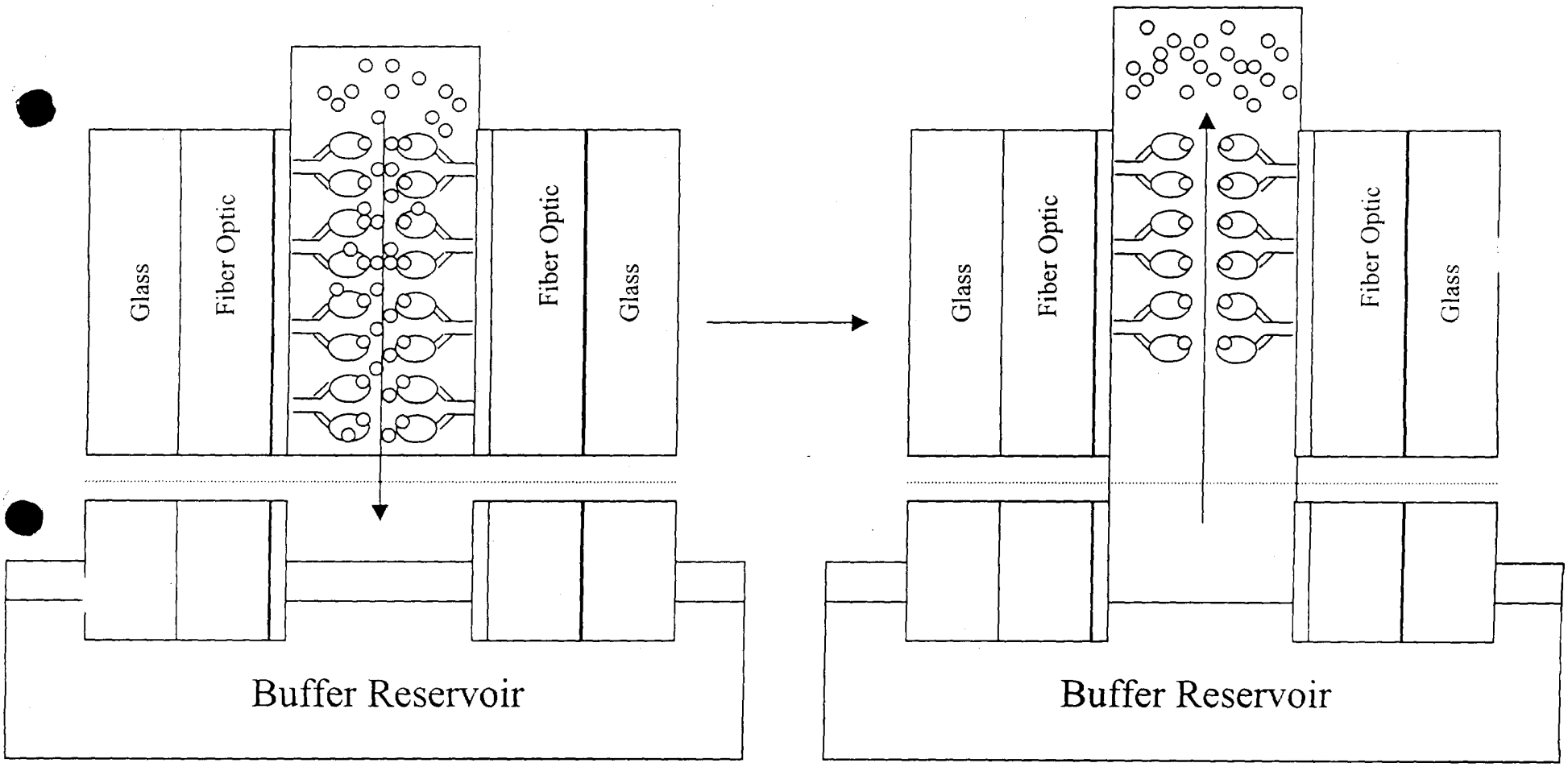


Figure 34 (cont. 1). Capillary Based Receptor Binding Assay: Non-equilibrium



Title: METHOD AND APPARATUS BASED ON BUNDLED CAPILLARIES FOR HIGH THROUGHPUT SCREENING
Inventor: Jianming XIAO et al.
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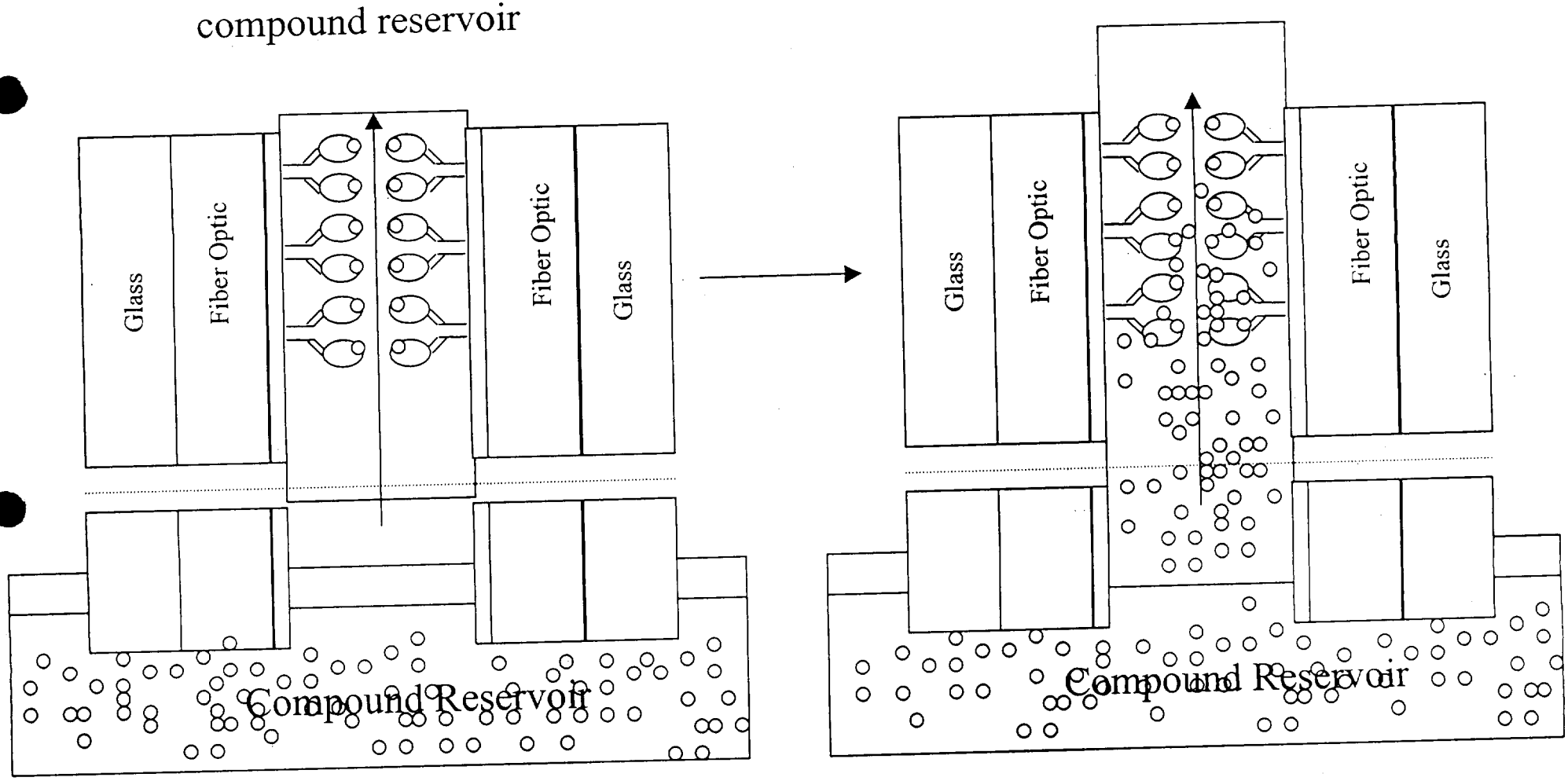
Figure 34 (cont. 2). Capillary Based Receptor Binding Assay: Non-equilibrium

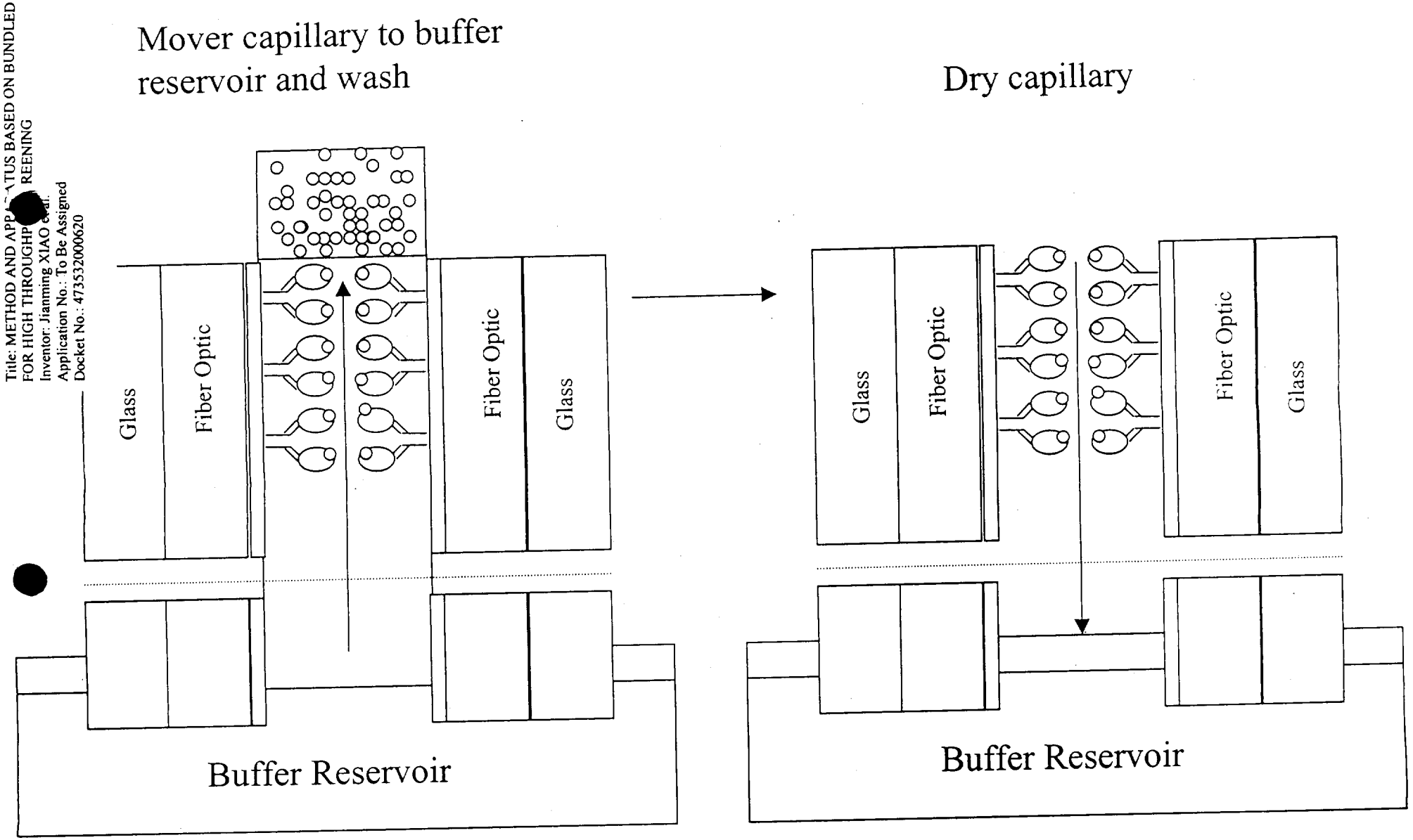
Move capillary to compound reservoir

Add compound and use fiber optic based detection to observe kinetics



Title: METHOD AND APPARATUS BASED ON BUNDLED CAPILLARIES FOR HIGH THROUGHPUT SCREENING
Inventor: Jianming XIAO et al.
Application No.: To Be Assigned
Docket No.: 473532000620

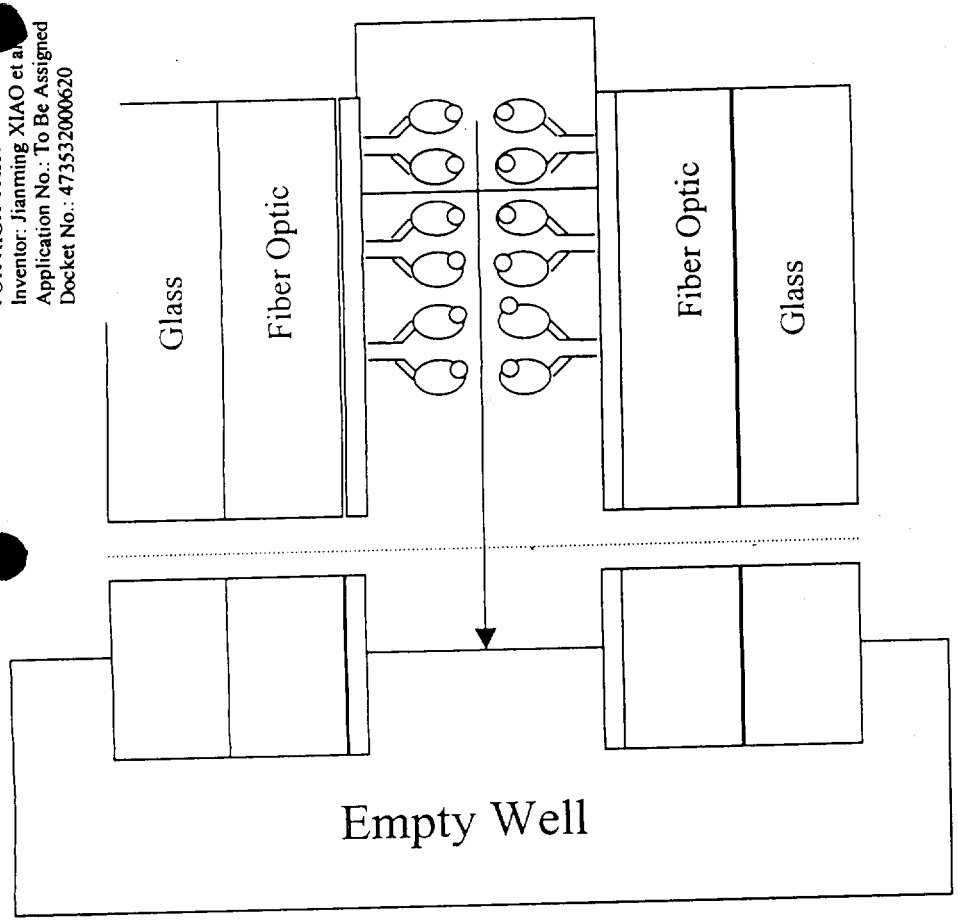
Figure 34 (cont. 3). Capillary Based Receptor Binding Assay: Non-equilibrium



Title: METHOD AND APPARATUS BASED ON BUNDLED CAPILLARIES FOR HIGH THROUGHPUT [illegible] ENING
Inventor: Jianming XIAO et al.
Application No.: To Be Assigned
Docket No.: 473532000620

Figure 34 (cont. 4). Capillary Based Receptor Binding Assay: Non-equilibrium

Push an acid plug or detect % bound using fiber optic based detection



Apply vacuum after pug travels down capillary

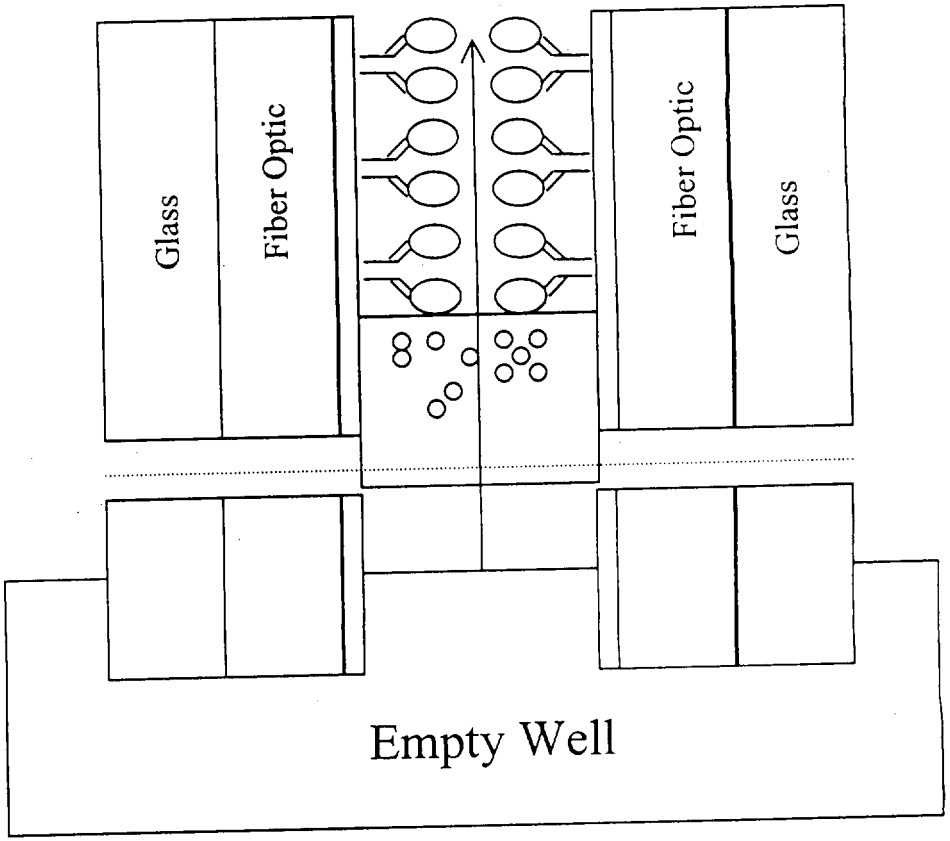
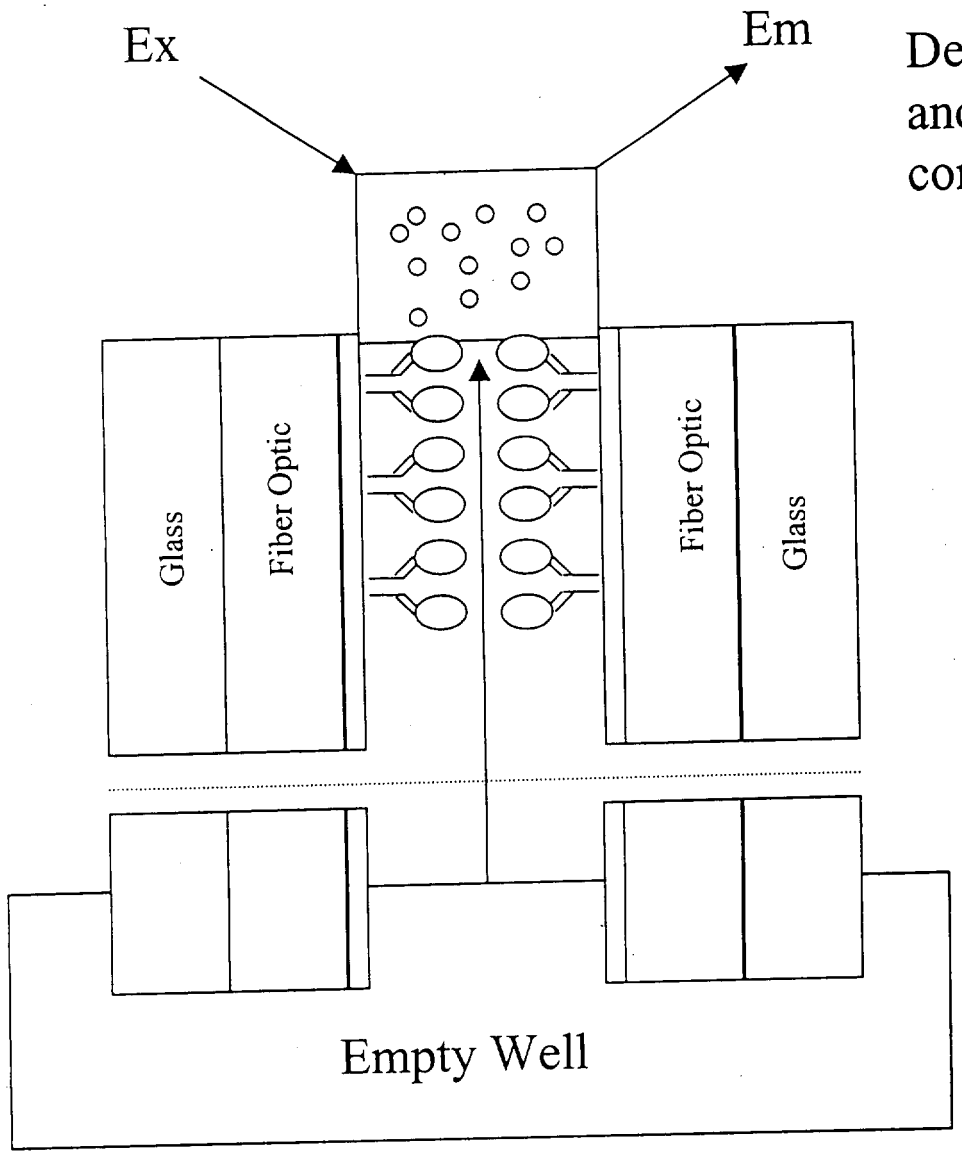
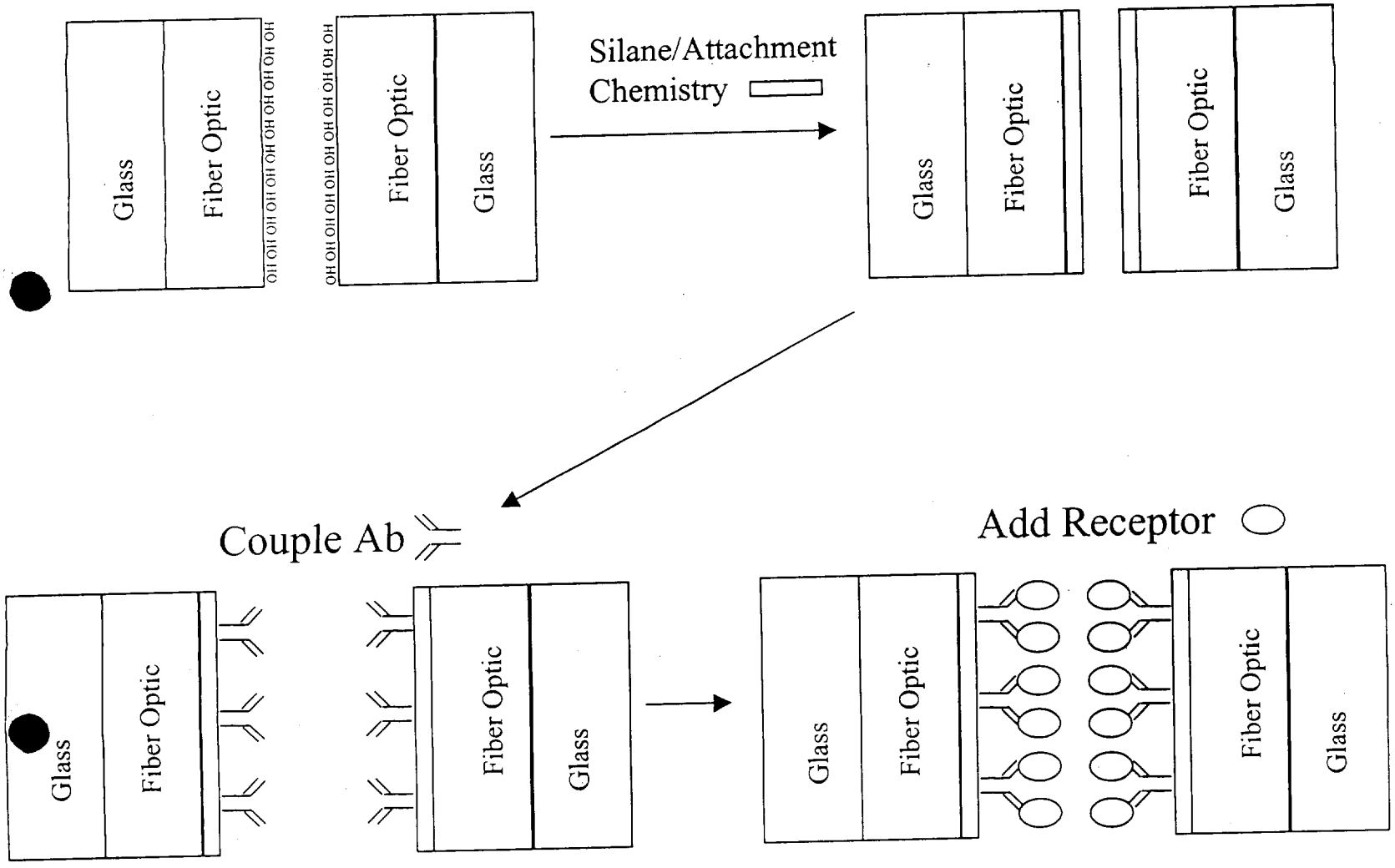


Figure 34 (cont. 5). Capillary Based Receptor Binding Assay: non-equilibrium



Detect Signal with and compare to a control capillary

Figure 35 Capillary Based Receptor Binding Assay: Equilibrium

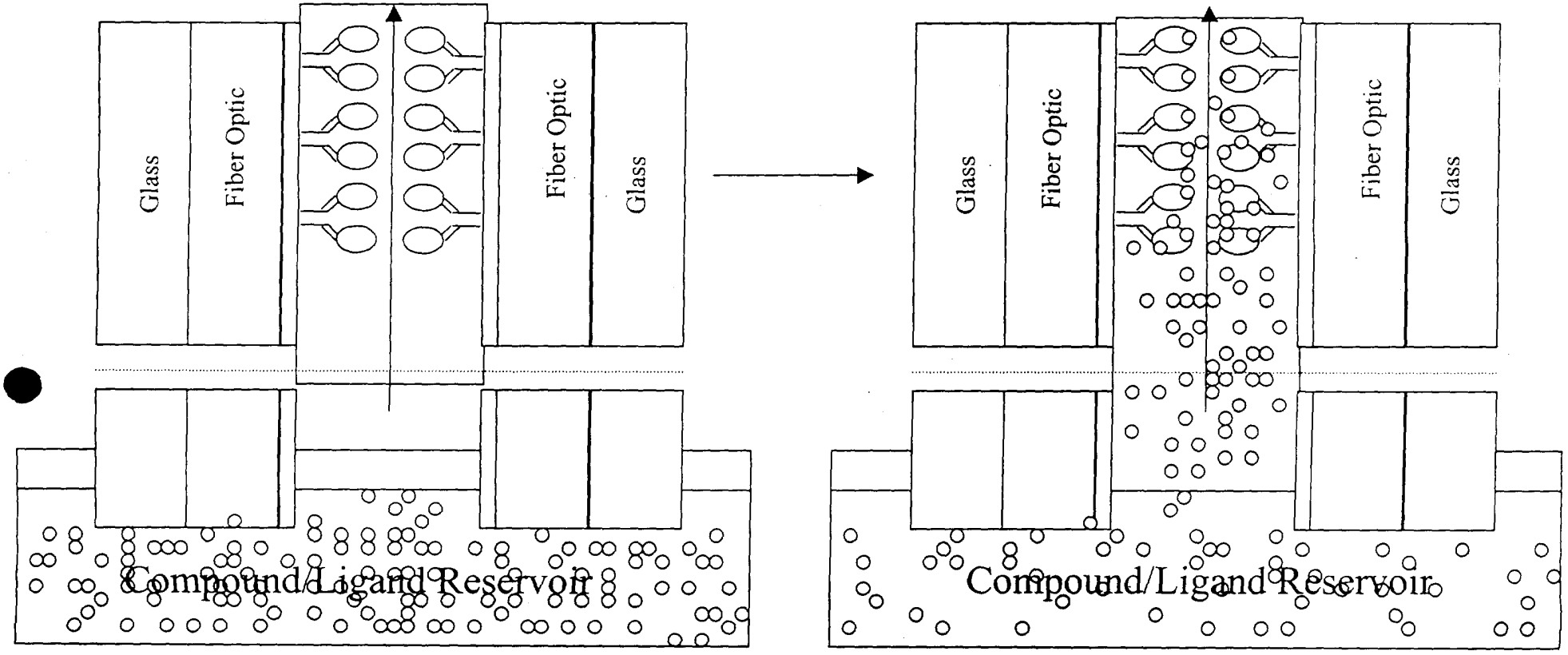


Title: METHOD AND APPARATUS BASED ON BUNDLED CAPILLARIES FOR HIGH THROUGHPUT SCREENING
Inventor: Jianming XIAO et al.
Application No.: To Be Assigned
Docket No.: 47532000620

Figure 35 (cont. 1). Capillary Based Receptor Binding Assay: Equilibrium

Move Capillary to compound/ligand reservoir.

Add solution and let system reach equilibrium. Detect equilibrium using fiber optic base detection.



Title: METHOD AND APPARATUS BASED ON BUNDLED CAPILLARIES FOR HIGH THROUGHPUT SCREENING
Inventor: Jianming XIAO et al.
Application No.: To Be Assigned
Docket No.: 47353200062O

Figure 35 (cont . 2). Capillary Based Receptor Binding Assay: Equilibrium

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Inventor: Jianming XIAO et al.
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Docket No.: 47353200620

Move capillary to a buffer reservoir and wash capillary with buffer. Detect % bound using fiber optic based detection.

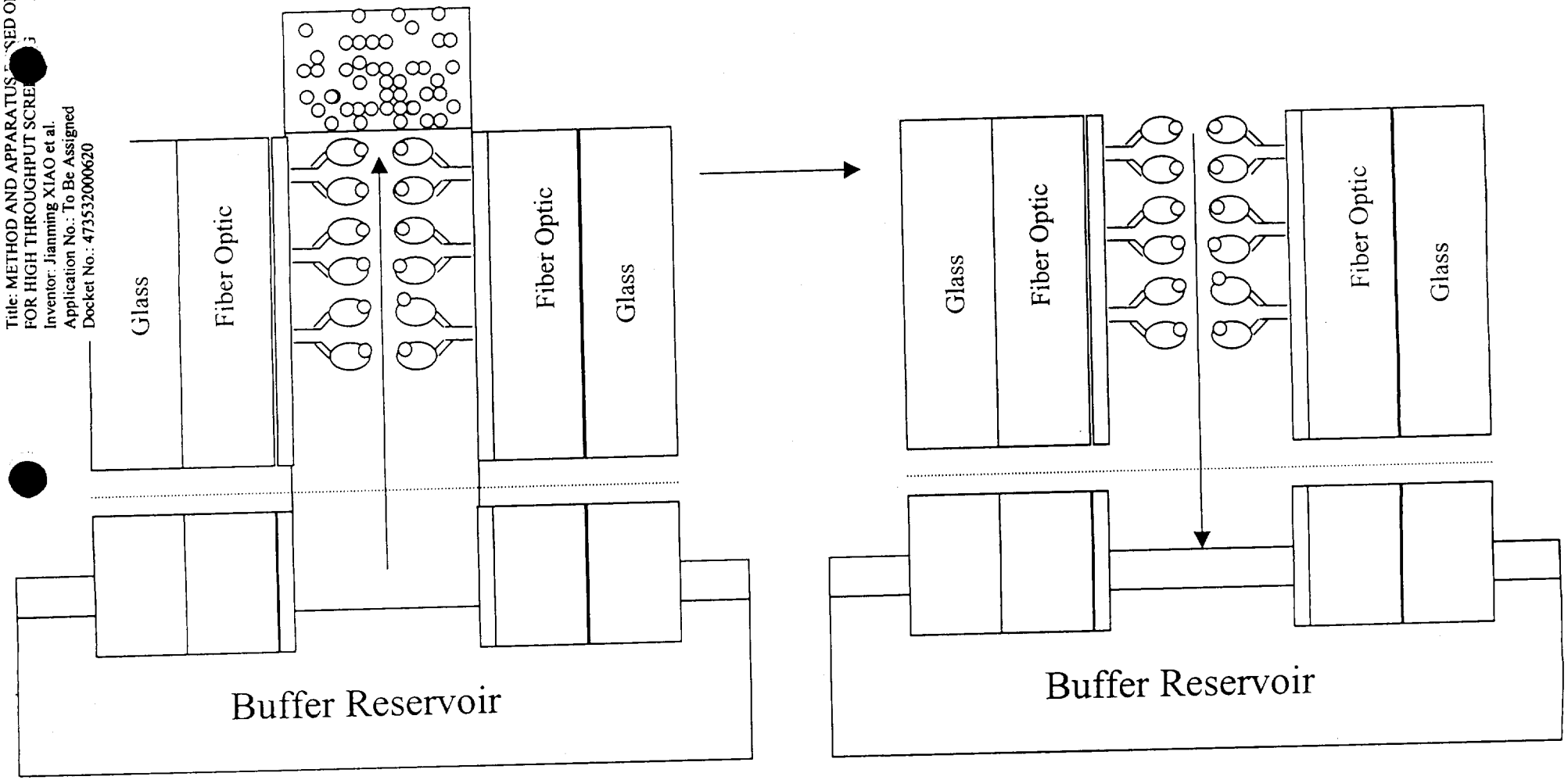

Figure 35 (cont . 3). Capillary Based Receptor Binding Assay: Equilibrium

Title: METHOD AND APPARATUS BASED ON BUNDLED CAPILLARIES FOR HIGH THROUGHPUT SCREEN
Inventor: Jianming XIAO et al.
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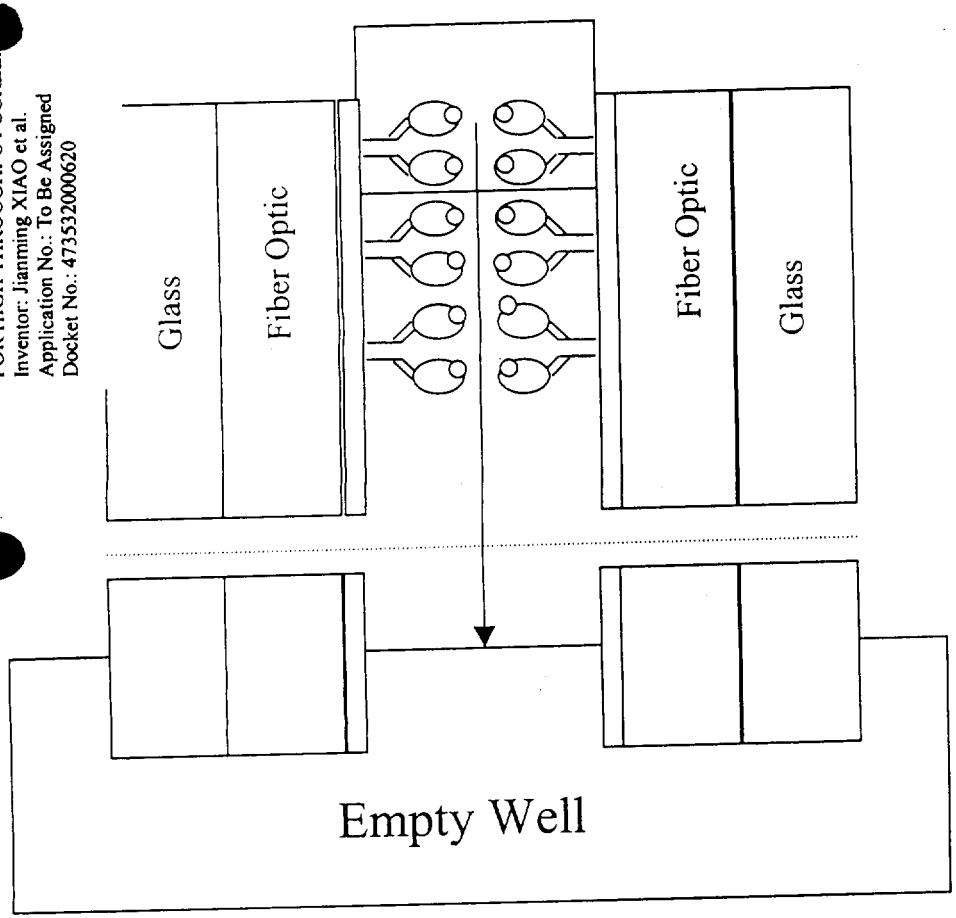
Detect signal using fiber optic base detection or elute bound ligand with acid.



Apply vacuum after pug travels down capillary

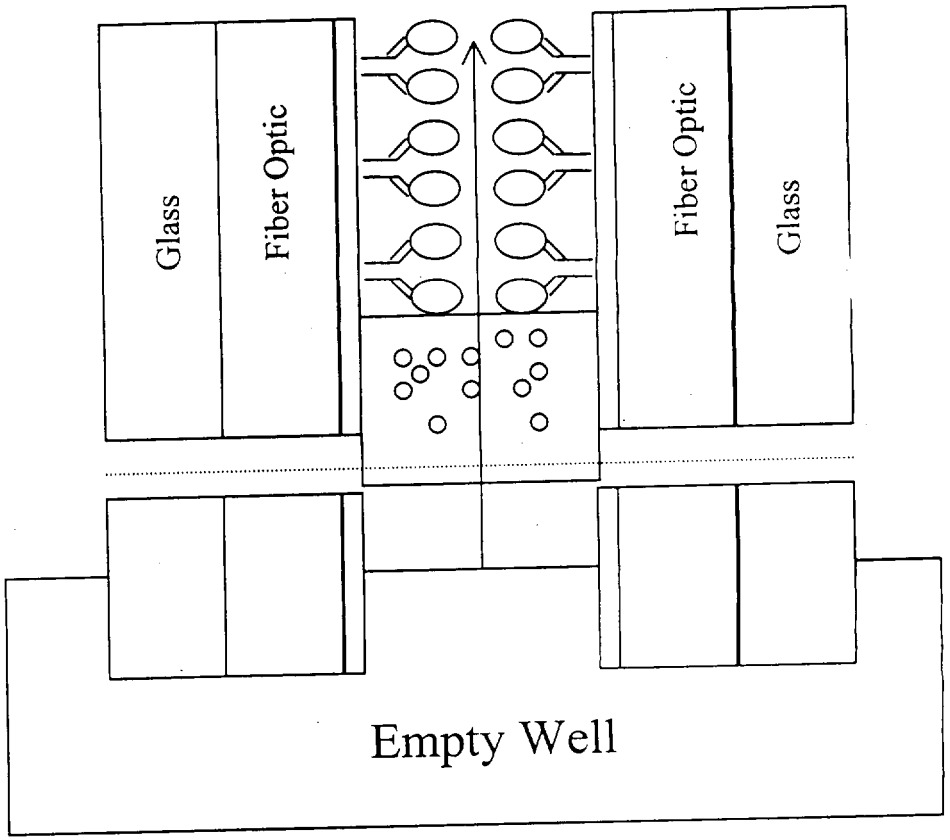
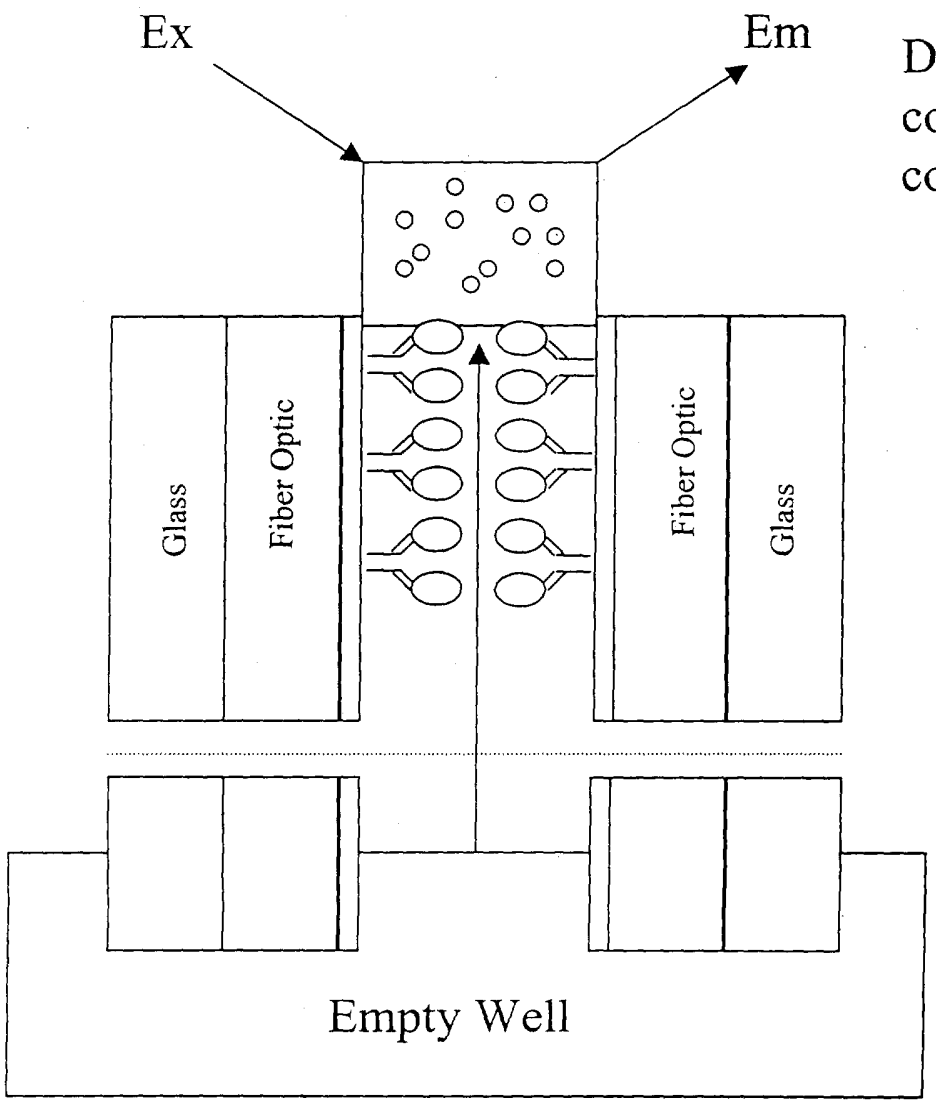


Figure 35 (cont . 4). Capillary Based Receptor Binding Assay: Equilibrium



Detect Signal and compare to a control capillary

Title: METHOD AND APPARATUS BASED ON BUNDLED CAPILLARIES FOR THROUGHPUT SCREENING
Inventor: Jianming XIAO et al.
Application No.: To Be Assigned
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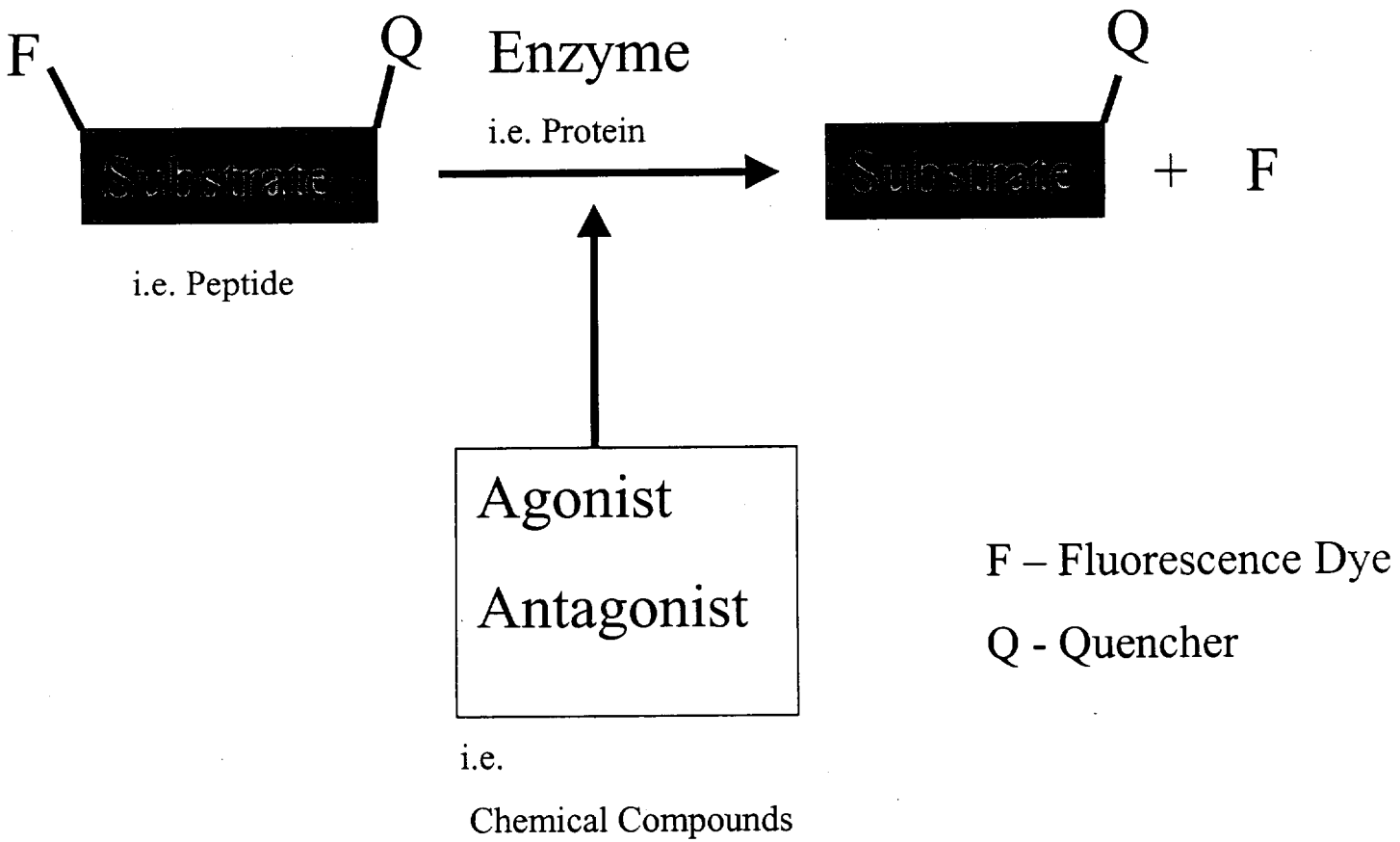

Figure 36

Title: METHOD AND APPARATUS BASED ON BUNDLED CAPILLARIES FOR HIGH THROUGHPUT SCREENING
Inventor: Jianming XIAO et al.
Application No.: To Be Assigned
Docket No.: 473532000620

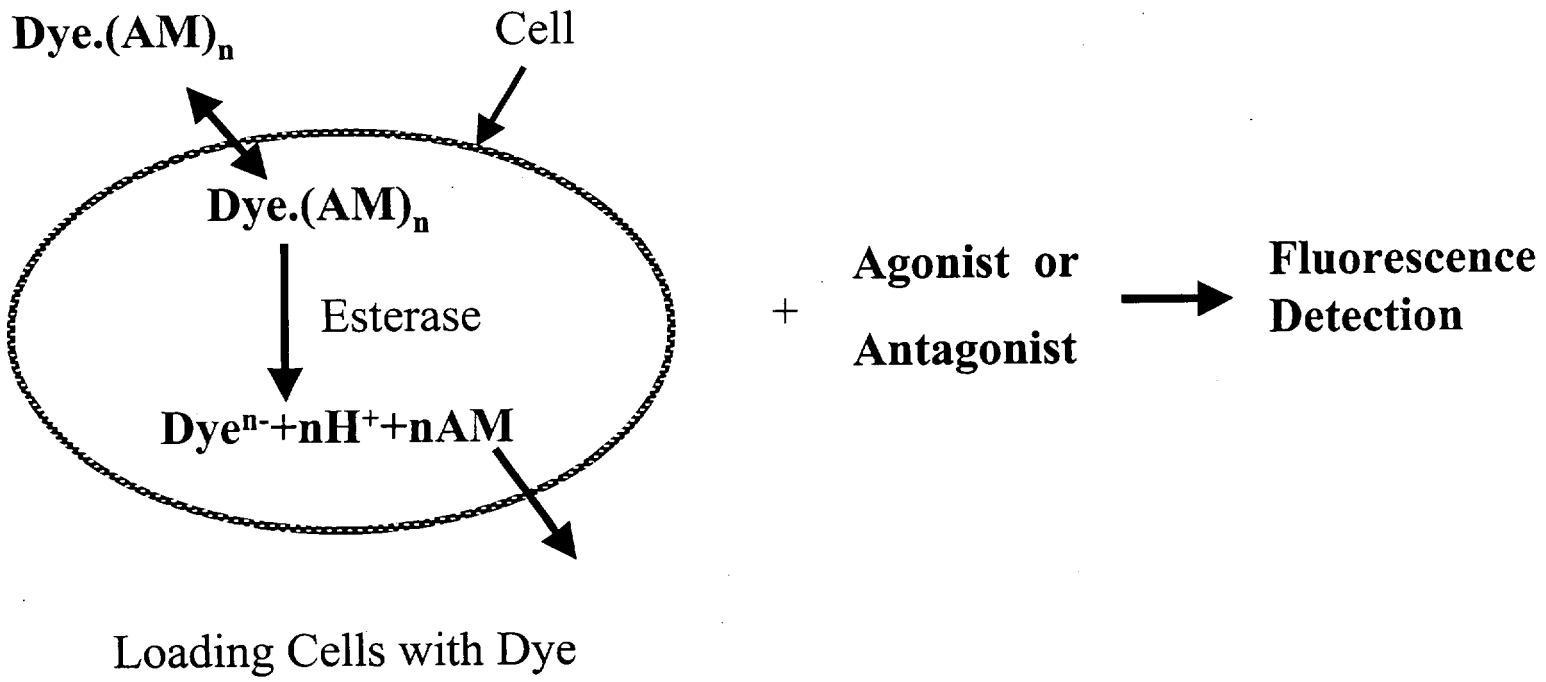

Figure 37

Title: METHOD AND APPARATUS BASED ON BUNDLED CAPILLARIES FOR GH THROUGHPUT SCREENING
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Application No.: To Be Assigned
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Protein Array & Cell Array

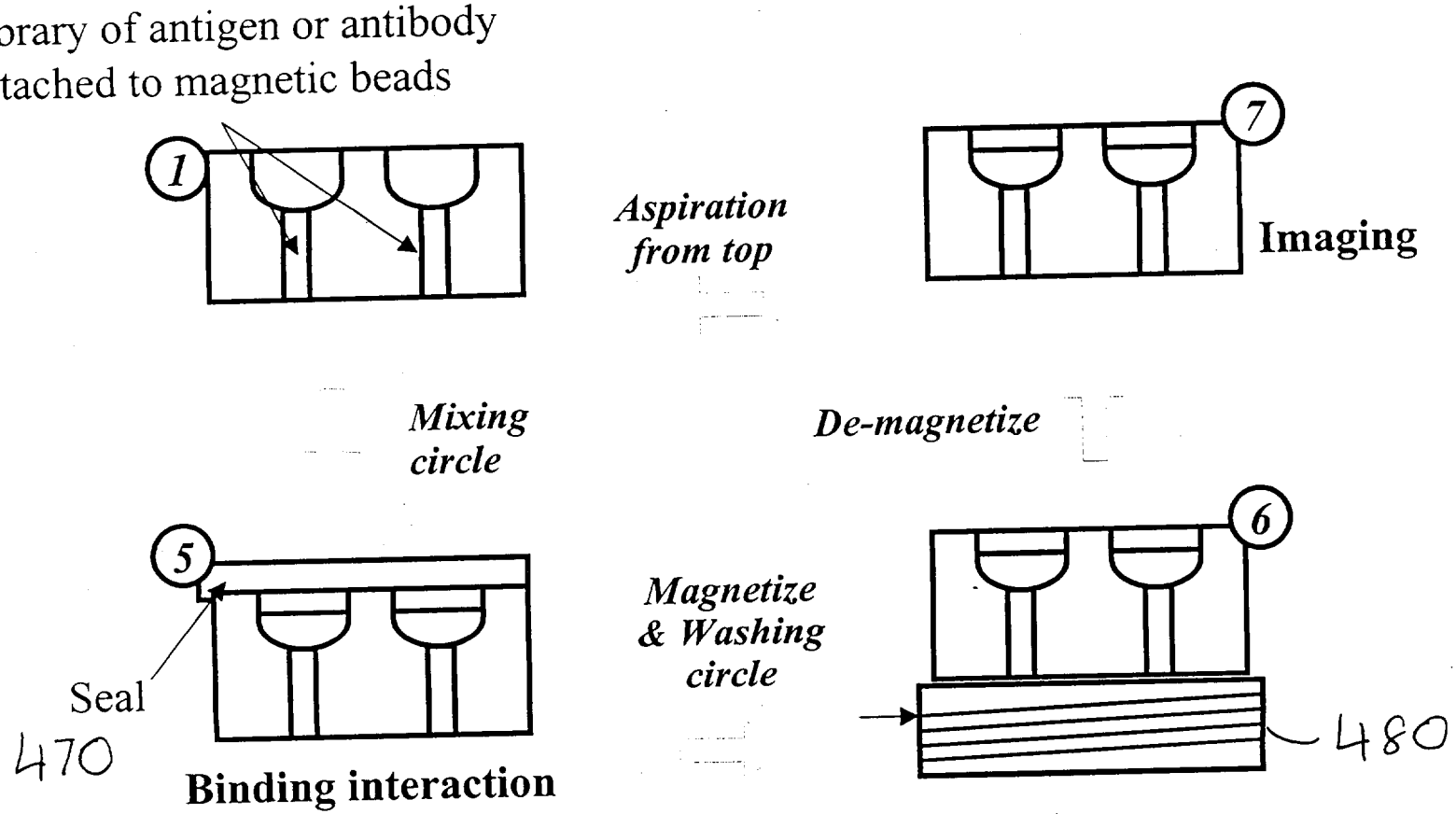


FIG. 38A

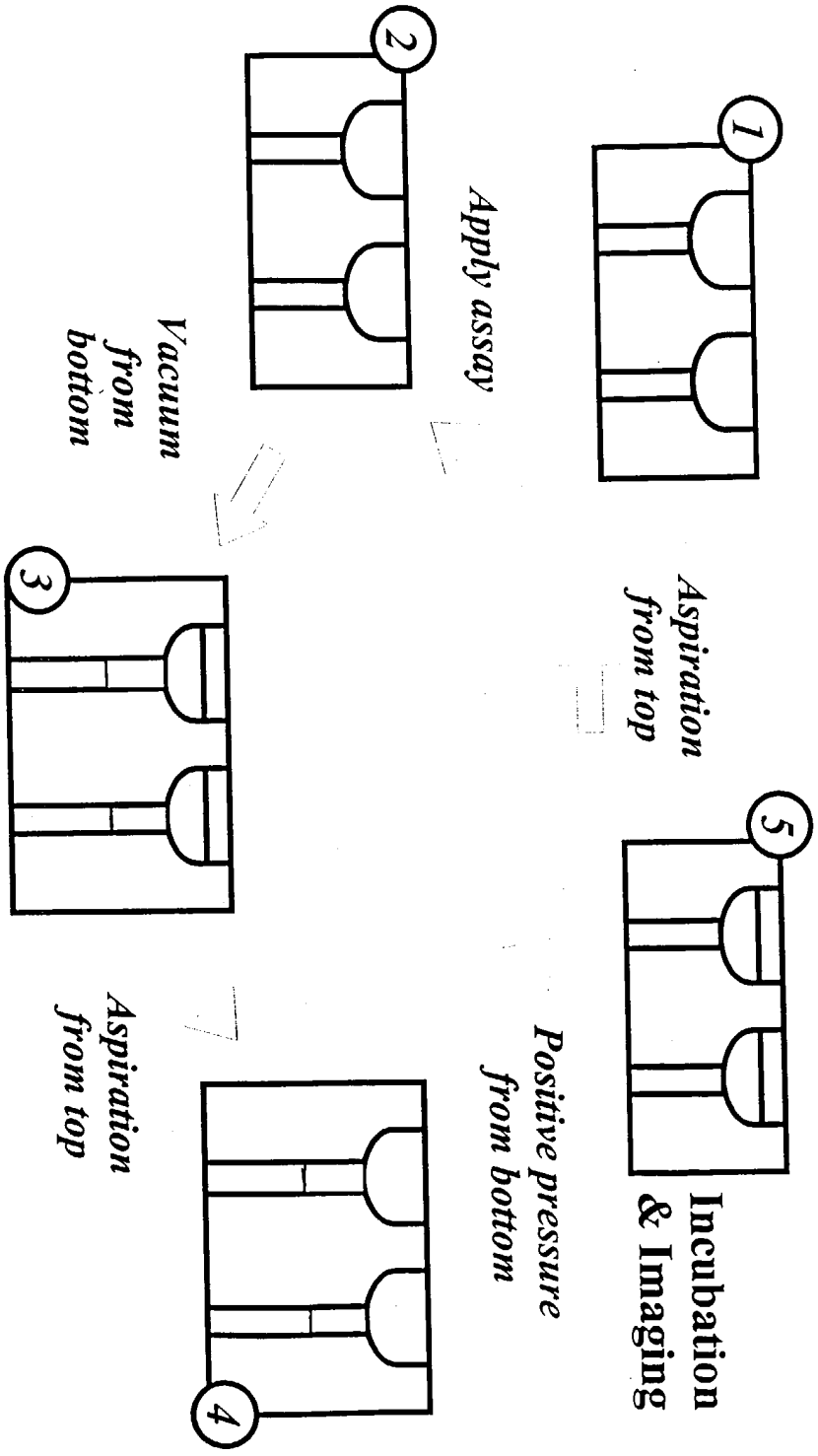
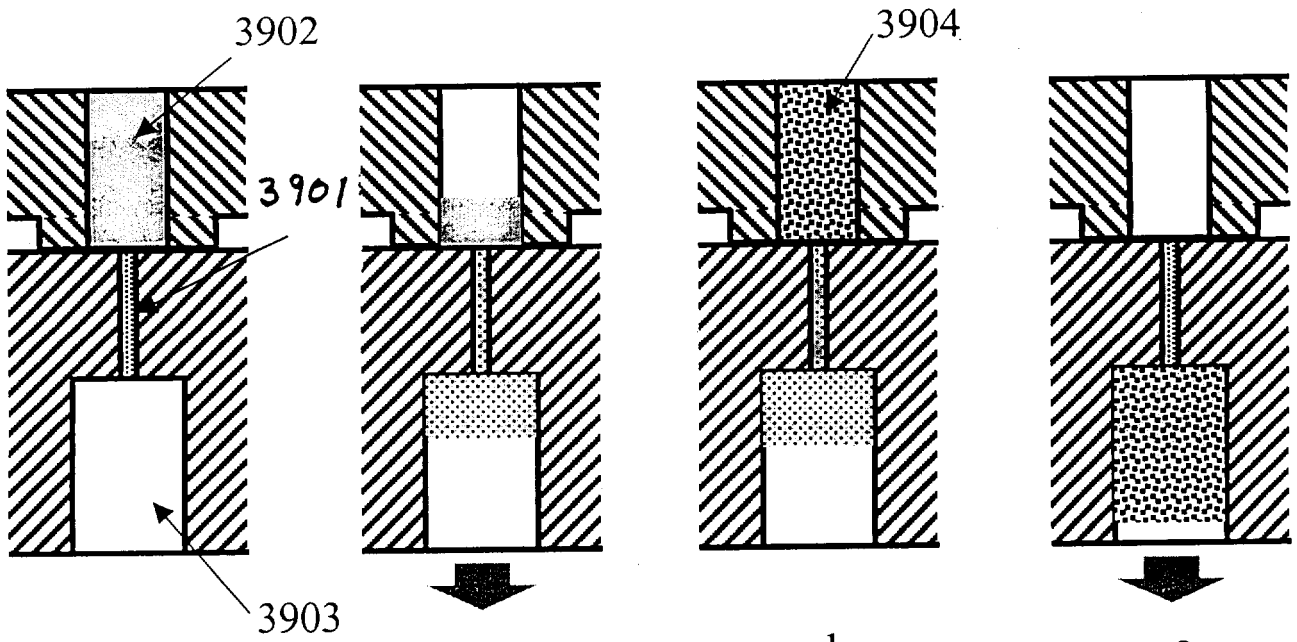

1
Aspiration from top
2
Apply assay
Vacuum from bottom
3
Aspiration from top
4
Positive pressure from bottom
5
Incubation & Imaging

FIG. 3B

Fig. 39 One embodiment of the capillary array cartridge design

Fig. 40 Metering with through hole plates and mixing



3901 – compound and compound storage chamber
3902 – reagent A (i.e. enzyme) in through hole plate A
3903 – mixing/reaction chamber
3904 – reagent B (i.e. substrate) in through hole plate B